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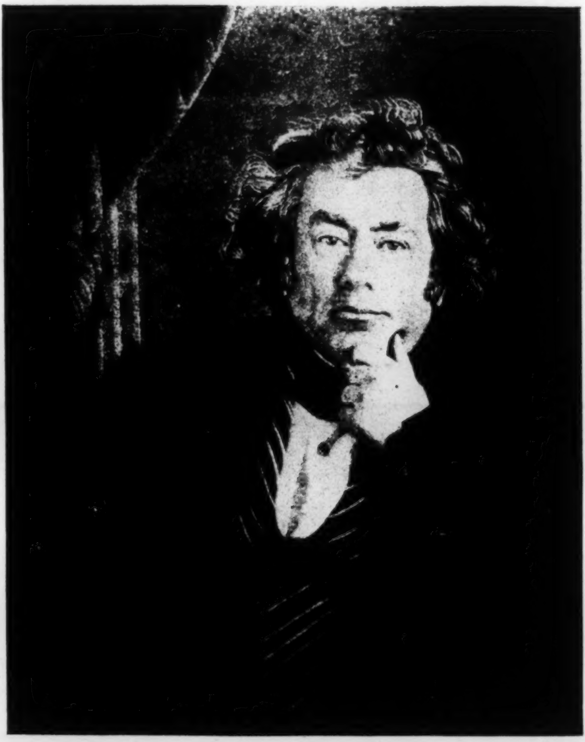

Robley Dunglison

Sennertus: Operum. Lugduni, 1676

ANNALS OF MEDICAL HISTORY
VOLUME X SUMMER, 1928 NUMBER 2

THE BEGINNINGS OF AMERICAN PHYSIOLOGY*

By WALTER J. MEEK, PH.D.

MADISON, WIS.

PHYSIOLOGY was the first of the experimental medical sciences. The development of the organized experimental laboratory was therefore not only the greatest single event in the history of physiology, but one of the epoch making incidents in the history of medicine. In Europe the modern physiological laboratory first appeared at Breslau in 1824, being founded single-handed by the great Purkinje. In America the same development took place at Boston and Baltimore during the seventies of the same century. We may then conveniently speak of the pre- and post-laboratory days. The former were characterized by sporadic attempts to study the living organism. For many years the physiologists of our country were either scattered practitioners in the wilderness and isolated hamlets, or professors in medical schools, who, while presenting anatomy, the institutes of medicine, or therapeutics, turned aside to speculate, occasionally to experiment on the functions of the living body. At rare intervals a student may have followed the course of his master, but no effort seems to have been made to secure such scientific issue. Those were the days in which medicine was an art and not a science except to a small minority who lighted the torch of inquisitiveness and sought to peer into the medically unknown. Methods of study were undeveloped. The muscle lever, the manometer and the smoked drum were still to be perfected. Huxley had not yet arisen to give that most influential definition, "Physiology is the physics and chemistry of life."

In America we were fifty years late in reaching the times of Purkinje and Liebig, for the Harvard and Hopkins Laboratories were not established by Bowditch and Martin until the seventies. During these years America prospered medically. Boston,

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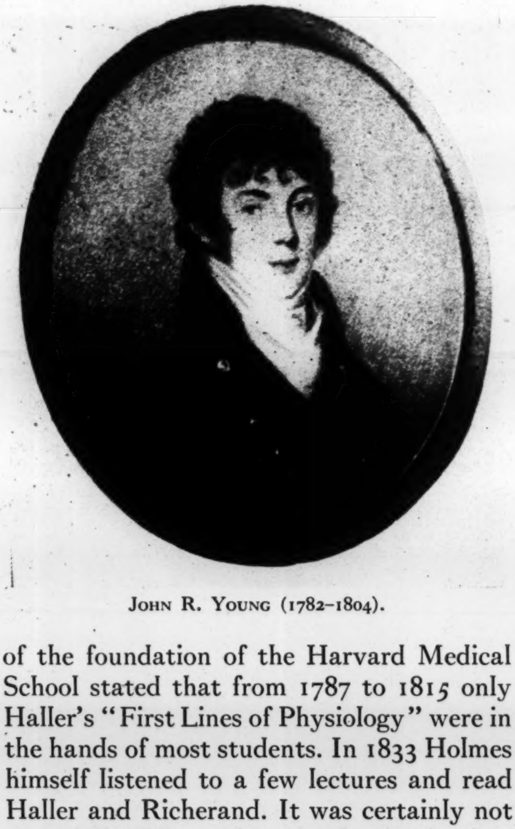
* This paper has been presented at the Historical Seminar of Dr. W. S. Miller, University of Wisconsin.

New York and Philadelphia became established as recognized medical centers. Schools sprang up, in too great an abundance, if the truth must be told. Several contributions of first rank were made to world medicine; the discovery of anesthesia, and the surgical procedures of McDowell and Sims. What was happening physiologically during these five decades? The part formally played by the schools can be dismissed almost with a word. Holmes at the hundredth anniversary of the foundation of the Harvard Medical School stated that from 1787 to 1815 only Haller's "First Lines of Physiology" were in the hands of most students. In 1833 Holmes himself listened to a few lectures and read Haller and Richerand. It was certainly not materially different in any other institution. A few lectures and possibly a text completed the student's physiological instruction and equipment. The story then, of these early years is not a connected one, and it can be told for the most part only by the biographies of those whose interest and endeavor touched this almost virgin field of medicine.



John R. Young (1782–1804).

In 1804 at the early age of twenty-two years there died in western Maryland a youth, John Richardson Young, who may well be called our pioneer American physiologist. He was a graduate of the University of Pennsylvania with the class of 1803 and he chose for his graduating thesis the subject "An Experimental Inquiry into the Principles of Nutrition and the Digestive Processes." To this topic he was doubtless guided by his Master, Benjamin Rush, who himself once wrote a thesis on "De coctione ciborum in ventriculo." Be that as it may, this young student attacked his problem with a skill and imagination far in advance of even his master's talents, and that master was styled the "American Sydenham" and the "Hippocrates of Pennsylvania."

The ideas concerning digestion in those days were vague and hazy in the extreme. Some believed gastric digestion was mainly attrition and trituration, others argued for putrefaction and fermentation. This caused Mr. Hunter once caustically to remark: "Some physiologists will have it that the stomach is a mill, others that it is a fermenting vat; others again that it is a stew pan; but in my view of the matter it is neither a mill, a fermenting vat nor a stew pan, but a stomach, gentlemen, a stomach."

Young essayed to clarify this confusion, a man's task indeed and a thankless one in the face of the great Cullen's almost universally accepted teachings. His first experiments were made on the big American bull frog. Into the frog's stomach he introduced a smaller frog, pulling the latter out with a string when he wished to examine it. He found that digestion was the formation of a true solution without the appearance of the least putrefaction. His further experiments seem to have been typically American, at least they remind one of the work done a hundred years later in several of our laboratories. He experimented on himself and a fellow student whom he found to be a regurgitator. Let us quote from his thesis.

> I took some meat on an empty stomach; in half an hour afterwards by irritating my fauces the meat was thrown up and with it some gastric fluid. Upon being tested an acid

was very evidently present. Here no one can suppose the acid was to be referred to the meat. We have little hesitation, therefore, in saying that the acid so constantly found in the stomach of man and probably in almost all the animals is to be referred to their gastric juice.

Young tested the gastric juice chemically as best he could and concluded that the acid present was phosphoric. In 1803 he narrowly missed the great discovery of HCl. This was later made by Prout in 1824. His achievements nevertheless were very real and very great. He showed conclusively that the gastric juice was an acid secretion and not a fermentative product. He did away with the ideas of trituration and putrefaction. He clearly pointed out that the function of this antiseptic gastric secretion is to get the foodstuffs into a soluble form. His whole attitude toward science he clearly expressed in those well-known words of Lavoisier, which he placed on the title page of his doctor's thesis. "We ought in every instance to submit our reasoning to the test of experiment and never to search for truth except by the natural road of experiment and observation."

It is idle to speculate how the development of physiology might have been changed had not the great white plague claimed the life of John Richardson Young at such an early age. The facts are that researches, which in a happier time would have won him renown and influence, lay buried for over a hundred years, until they were rescued from complete obscurity by the historian.

That some one at the University of Pennsylvania during these early years of the past century was stimulating activity in experimental physiology is evidenced by the publication of two other theses on gastric digestion. The first of these by Oliver H. Spencer was also presented in 1803 and entitled "Experiments and Observations on Digestion." The work is scarcely less meritorious than that of Young. By strictly experimental methods the young worker sought to find the real nature of gastric digestion. He secured material from his own stomach by heroically taking tartar emetic five hours after breakfast. Finally "for a considerable compensation" he prevailed upon a healthy young negro man to furnish him with suitable gastric digests. Dogs and cats were killed at various intervals after feeding and the stomach contents examined. As a result of his studies Spencer concluded that gastric digestion was neither putrefactive nor fermentative but that it consisted in forming a true solution from the food stuffs.

The second thesis to which we have just referred was by Thomas Ewell who graduated in 1805 and the title of his inaugural essay, which was published in May, was "Notes on the Stomach and Secretion." He attacked Spallanzani's observations that the gastric juice of herbivora could not digest muscular tissue and that the juice of the carnivora could not digest vegetable substances. By a two week's experiment he proved that a horse could take 18 ounces of meat mixed with its meal "at once and without hesitation." Ewell attributed an antiseptic function to gastric juice, stating that it not only prevented but actually arrested putrefaction. In a dog he isolated with ligatures some 2 feet of the ileum and into this injected some well-boiled meat saturated with pig's gastric juice. The intestine was returned to the abdomen and in three hours the animal was killed. The autopsy showed that one third of the material had been absorbed and the lymph glands contained chyle. So far as we are able to find this was the first vivisection experiment made in America. Ewell's work did not have the excellence of Young's, but it was forward looking and added to our knowledge of the gastric juice. Unfortunately he did not continue his experimental studies. A collection of his essays published in 1819 shows that on the contrary he gave himself up to many disputatious vagaries. He particularly enjoyed criticizing the selection of members to the medical staff of his alma mater.

The good work thus begun at the University of Pennsylvania seems not to have been continued. Indeed it is strange that the school which gave rise to the first three pieces of physiological work in America should not have had thereafter a larger part in establishing that science. For thirty years there seems to have been nothing worthy of the name physiological, in all America until suddenly, from the wilderness, unheralded and unknown, there came news of the great work of William Beaumont, in 1833.

William Beaumont (1785–1853).

The story of Beaumont is so well-known that I need refer to it here only in outline. Scientific opportunity came to Beaumont in the guise of an accident to one Alexis St. Martin, a Canadian voyageur employed by the Canadian Fur Company. In a little store at Macinac on June sixth, 1822, a gun was accidently discharged striking the youth Alexis in the left side at the level of the diaphragm. Beaumont, the young army surgeon at the post was called and found both the stomach and thoracic cavity torn open by the charge. Miraculously the patient survived although it was two years before he could be considered well. The opening to the stomach, however, never closed and a bandage of lint was necessary to retain the stomach contents.

It was not until 1824 that Beaumont realized the unique opportunity presented to him for investigating gastric digestion, and actual experiments were not begun until May, 1825. Beaumont had in the meantime from his meager salary entirely supported Alexis for over two years. The actual studies began in May, 1825 at Macinac. The next month Beaumont was ordered to Fort Niagara, and later in the summer to Plattsburg. Alexis accompanied him, but at the latter place, tiring of the experiments he took "French leave" of his benefactor. For two years Beaumont hunted the fugitive, finally learning of his whereabouts through the fur traders. Two years more elapsed before the runaway could be induced to come to Fort Crawford, where Beaumont was then stationed, for a second series of experiments. In the meantime Alexis had married and become the father of two children. At his own expense Beaumont had the family transported to Prairie du Chien, a distance of 2000 miles, where experiments which lasted until 1831 were immediately begun. Alexis then returned to Canada but in 1832 he again came to Beaumont at Plattsburg for a third series of investigations.

Altogether some 238 experiments were made by Beaumont on Alexis St. Martin. A few of these were published in *The Philadelphia Medical Recorder*, but the majority of them were first given to the world in an octavo volume of 280 pages entitled "Experiments and Observations on the Gastric Juice and the Physiology of Digestion," which was published at Plattsburg in 1833. This was the first really great physiological contribution ever made in America, and it will always remain a classic on the subject of gastric digestion. The exact experiments which Beaumont managed to perform with a thermometer and a sand bath have excited the admiration of all students from that day to this.

The following may be mentioned as the most important of Beaumont's observations and conclusions.

The tables showing the length of time it takes various foods to digest in the stomach will remain valuable data and an important contribution to practical dietetics.

Animal foods are digested more easily than vegetable. Oily substances retard digestion and delay the passage of foodstuffs from the stomach. Farinaceous foods may pass through the stomach while the others are retained for the solvent action of the gastric juice.

Beaumont is to be credited with the first accurate description of the gastric juice itself. He says,

> Pure gastric juice . . . is a clear transparent fluid; inodorous; a little saltish, and very perceptibly acid . . . an effectual solvent of the materia alimentaria . . . is powerfully antiseptic, checking the putrefaction of meat; and effectually restorative of healthy action when applied to old foetid sores and foul ulcerating surfaces.

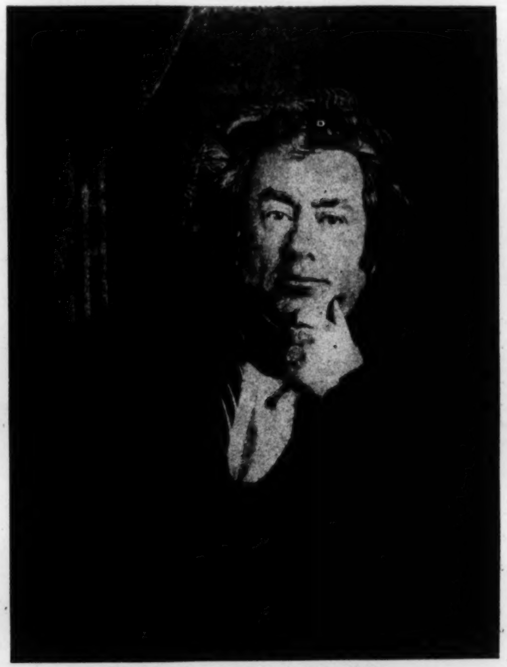
Mental disturbances have a profound influence on the secretion of gastric juice and digestion.

Water passes out of the stomach very quickly after being taken.

The discovery first made by Prout that the acid of the gastric juice was HCl was amply confirmed. Analyses of the juice were made by Dunglison at Virginia and Silliman at Yale, both of whom reported free hydrochloric acid.

One of the greatest services rendered by Beaumont's work was to suggest to physiologists a method of studying gastric phenomena in animals. If a man could live with an accidental gastric fistula certainly one could be made in animals. Beaumont, thus quite unconsciously, was the inspiration of the miniature stomach method of Heidenhain and Pavlov. It is true that gastric fistulas were known before the time of Beaumont, but never before had a case been thoroughly studied or the attention of workers directed to this means of securing physiological information.

Although Beaumont's work was fully recognized by scientists of his time and remains one of the chief glories of American physiology, its direct influence on the development of this science seems to have been negligible. No university offered him a professorship. No medical school invited him for a course of lectures. Indeed a surgeon general of the United States Army established his chief claim to fame by forcing Beaumont out of the service. The American scientific world was not yet ready for science. Isolated workers, inspired by their own native interest or the slowly penetrating fame of European schools, had still to labor through many decades before their leaven was to permeate the whole lump and the conscious need of experimental medical science could force the development of organized departments and laboratories. Beaumont's story of Alexis



ROBLEY DUNGLISON (1798–1869).

St. Martin is told by the teacher in the grades and the descriptive phrases from "The Physiology of Digestion" still linger in our medical texts. That sound and useful information had been obtained in the experimental way must have aroused a certain sense of its need.

Our knowledge of American physiology from the time of Beaumont to 1858 rests mainly on an article by S. Weir Mitchell printed in the *North American Medico-Chirurgical Review* of that year. Although admitting that many important articles have appeared, the author is not particularly flattering in his remarks about most of the literature of the period. He remarks that,

> No one can read our journals without being struck with the number of theorizing papers, parading long lists of facts derived from the pages of other writers, without an effort to add one new or freshly invented experimental illustration. This eager love of appearing in print at all hazards finds also profuse self indulgence in dreary controversial papers, which are only too common in some of our journals, and of whose multitudinous dullness no luckless bibliographer has as yet taken the census.

To illustrate he cites the paper of a lady physiologist, Mrs. Emma Willard on "Respiration as the Motive Power of the Circulation of the Blood," which excited "a buzz of mingled admiration and mockery, whose mortal result is to be found in eighteen papers, pro and con which adorn the pages of a northern and southern journal."

Among the writers of the pre-laboratory period who must have very greatly influenced medical development in America was that roving internationalist, Charles Edward Brown-Sequard. By virtue of an American father, two American wives, and four extended visits in this country, we may claim a part of his glory, although he was by training French and in Paris he achieved his greatest triumphs.

Brown-Sequard had a passion for physiological experimentation. With him practice was always a means to an end. Though having a practical knowledge of medicine that would have yielded him a magnificent income in any capital of the world he was usually in dire poverty. A dollar in his pocket was a temptation to stop and experiment, and that temptation he seldom resisted. Brown-Sequard first visited America in 1852, practicing for one year in New York. Beginning with 1855 he was for a time professor of the institutes of medicine at the Virginia Medical College in Richmond. From 1864 to 1867 he was professor of the physiology and pathology of the nervous system at Harvard. From 1872 to 1877 he was again a practicing physician. The intervening years were spent in London, Paris, Geneva and the ends of the earth. In 1878 he succeeded Claude Bernard, and his great career really began.

Our remarks about this great and most interesting man must be limited to his American work. Several of his best known contributions either appeared in American journals or were published in this country. In 1853 he printed his "Experimental Research Applied to Physiology and Pathology." In this he described many experiments on reflex action and confirmed and extended the conclusions of Marshall Hall. He also announced the production of an artificial epilepsy in the guinea pig by lesions of the spinal cord. This was followed by a series of articles in *The Boston Medical and Surgical Journal* during 1856 and 1857 on the same subject. Brown-Sequard's best work was probably his observations on the pathways of conduction in the spinal cord. He first noted and correctly interpreted the condition now known as "Brown-Sequard's paralysis." In 1868 there appeared in Philadelphia his "Lectures on the Diagnosis and Treatment of Functional Nervous Affections" which represent in part the work done while he was a professor at Harvard.

It is hard to say specifically just how Brown-Sequard influenced American Physiology. But there is no doubt that to this man whom so many, in America, loved and respected must be given much credit for the final introduction of laboratory ideas into medical education because he always placed experiment above every other earthly thing.

The best known native writer on physiological subjects during the fifties was Bennet Dowler (1797–1879) of New Orleans. He is credited with having first noted and studied the post-mortem rise of temperature as well as idio-muscular contractions of muscles in subjects recently dead. Dr. Dowler rejected the idea of centralization in the brain, of volition and sensation. After the destruction of various parts of the central nervous system both in alligators and cats he claimed to recognize voluntary motion and sensation. He therefore believed that volition might exist apart from the brain and that the sensorium might be diffuse. The Bell-Magendie law he particularly opposed. His observation on kittens, that after destruction of the lower part of the spinal cord the urinary apparatus may regain its tonicity, is of interest and importance. Dowler was a voluminous writer. He contributed 1100 pages to medical literature, most of which unfortunately was not in accordance with the development of modern nervous physiology. This he himself recognized toward the end of his writings saying, "It will be found upon examination that Satan (i.e. Bell and Hall) has the largest congregation."

Another American who had a great reputation at about the same time was H. F. Campbell. Campbell saw in the sympathetics a nervous system particularly related to the processes of secretion and nutrition on the one side and intimately connected with the sensory nerves on the other. The functions carried out by this mechanism he designated as the "excito-secretory." Marshall Hall also had much the same idea but he acknowledged Campbell's priority. Campbell was a prize essayist of the American Medical Association in 1857. He was made a fellow of the St. Petersburg Imperial Academy of Sciences. Campbell's term of "excito-secretory" has of course dropped out of the literature, although much the same mechanism has in recent years been repeatedly invoked to explain the action of certain glands of internal secretion.

One of the truly admirable papers of 1856 was that of S. C. E. Isaacs entitled "Researches into the Structure and Physiology of the Kidney." This was followed in 1857 by an article "On the Function of the Malphigian Bodies of the Kidney." He preceded Heidenhain in the use of dyes to determine the place of actual secretion. He found the glomeruli stained with dyes, colored with bile and congested after injections of irritants. He therefore concluded that the Malpighian bodies are the principal agency in the secretion of urine. Isaacs' combination of anatomical and physiological studies were in great contrast to much of the loose thinking of the day.

A few other names may be mentioned. W. Hammond, assistant surgeon United States Army made some important researches relative to the effects of albumen, starch and gum when used singly and exclusively as food. His analyses of the excreta and careful determinations of body weight have all the appearances of a modern metabolism experiment.

Some experimental work on the heart of the sturgeon by J. K. Mitchell is also worth mentioning. Dr. Mitchell was professor of medicine at Jefferson Medical College. He had much of the wit, apt illustration, and literary ability which distinguished his illustrious son S. Weir Mitchell.

To this period belongs the work of J. W. Draper. Draper's "Human Physiology" published in 1856 went through many editions and was an admirable text. Draper's papers had to do with physical explanations of auditory and ocular phenomena, the motor forces acting upon the blood in the capillaries and the function of the bronchial muscle fibers. Draper was one of the most versatile geniuses America has ever produced. He wrote on the "History of the Intellectual Development of Europe," and he had the honor of being the first man in America who ever made a daguerreotype.

From 1830 to 1857, Mitchell reports as being worthwhile; 11 papers on the nervous system, 11 on the special senses, 20 on digestion and absorption, 17 on the circulation, 13 on secretion and respiration and 17 on nutrition and growth.

In a history of American Physiology, the name of Oliver Wendell Holmes deserves at least mention. From 1847 to 1865 he was responsible for the physiological teaching at Harvard. The work was mostly didactic, consisting of some 20 lectures. Dalton's text was used. A few demonstrations were made, such as simple digestive experiments, and an exhibition of the lacteals. Holmes had, however, a certain amount of inventive genius and there is still preserved in the Harvard laboratories an apparatus made by him for showing negative after images.

Austin Flint, Jr. (1836–1915).

I wish now to speak of three men whose influence on American physiology has been so far reaching that they deserve a place somewhat apart from those we have just discussed. Their names are Robley Dunglison, Austin Flint and S. Weir Mitchell.

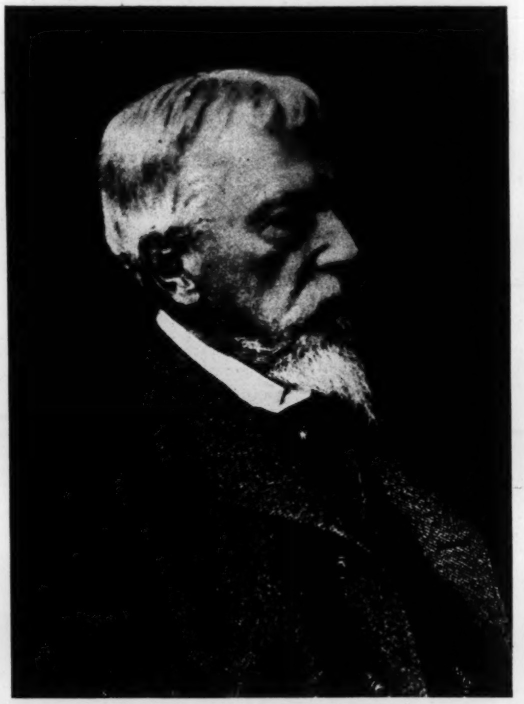
In 1824 when Thomas Jefferson was organizing the University of Virginia, he asked a young man in London to come and be professor of anatomy, physiology, materia medica, pharmacy, and a course in the history of medicine. This young doctor, already an author and editor, was Robley Dunglison (1798–1869). He remained nine years at Virginia, and then went to the University of Maryland. After a short time in this institution he became professor of the institutes of medicine at Jefferson Medical College, an appointment which he held for over thirty years. Dunglison achieved some fame in a chemical study of the gastric juice from Alexis St. Martin, but his reputation rests mainly on his various writings. Samuel D. Gross says that his sensitive nature never allowed him to engage in any experiment involving pain or the destruction of life. His "Human Physiology" rejected in Philadelphia but published in Boston in 1832, went through many editions. In 1858 over 95 thousand copies had been sold. Gross says "What Haller's great work accomplished for surgery in the eighteenth century, Dunglison accomplished for physiology in America in the nineteenth." His "Medical Dictionary" ran through 23 editions. These books were followed by treatises on "Materia Medica," "Hygiene," "The Practice of Medicine," "New Remedies," "The History of Medicine" and innumerable articles in medical journals. Dunglison was always known as a physiologist. His great reputation added dignity to the name and emphasized the importance of this branch of medical science.

Another man who by his writings and by his ability as a teacher gave a great impetus to the development of physiology was Austin Flint. Physiologist and alienist, he was the son of one of the most distinguished physicians of the time. There have now been six generations of this family, each furnishing a medical man of distinction. Austin Flint, the fifth, was born in 1836 and died in 1915. He graduated at Jefferson in 1857. Previously he had been for a time an assistant under Dalton at the University of Vermont. It may have been here that his interest in physiology began. He also studied abroad under Bernard and Robin. Flint was first professor of physiology at Buffalo. In 1861 he became one of the founders of Bellevue Hospital Medical College. Except for a period of service in the Civil War, he remained here as professor of physiology until 1898, when he took the same position in the New Cornell University Medical School and in the year 1906 he was made professor emeritus.

Flint's graduating thesis was on the "Phenomena of the Capillary Circulation." In this he attempted to show that the course of the capillary circulation was not due entirely to the beat of the heart but in large measure to an attraction of the capillary walls and tissues which he termed "the capillary power." In 1862 he discovered in the feces a substance which he called "Stercorin," recognizing it as a derivative of cholesterin. This piece of work was given honorable mention by the Institute of France. It did not, however, secure full recognition due to a pronouncement against it by Hoppe-Seyler. However, in 1896 the same substance was rediscovered by Bondzynski and named "Koprosterin." Flint's work was entirely confirmed. One of Flint's best known pieces of work was the investigation made upon the long distance walker, Weston, who attempted to walk 400 miles in five consecutive days. This data which had largely to do with the nitrogen output before, during and after the walk was published under the title of "Relations of Man to Exercise." The conclusions were indefinite but the data has been constantly referred to in discussions of this subject.

Flint's greatest influence was exerted as a teacher in well-known schools and by means of his text books. From 1865 to 1874 there appeared his physiology of man in 5 volumes. With its references to the literature and its presentation of the best French work this publication had a great influence upon contemporary physiology. His one volume, "Human Physiology," was widely used as a text in medical schools.

Of all the medical men who developed in the pre-laboratory period probably no one achieved as great a degree of renown and distinction as S. Weir Mitchell (1829–1914). For over fifty years he was a busy practitioner, yet his name was known internationally as an experimental physiologist, a neurologist, a physiologist, and a man of letters. He touched life at many places indeed, and always with penetration.



SILAS WEIR MITCHELL (1830–1914).

By his writings Mitchell was a great teacher although he never held academic positions of any importance. Early in his career a vacancy occurred at Jefferson but the trustees did not have the vision to elect him. A few years later Pennsylvania made the same mistake. Years afterward, he became a trustee of the University of Pennsylvania, after a fight for progressive principles in which his election was secured by Pepper, Wood and others. It was shortly after that his friend Dr. Allen remarked: "Thou shalt not be King, but thou shalt beget Kings." What discoveries he would have made had he given himself up to continuous methodical work! His influence, however, could scarcely have been greater. Twenty-five men who served under him from 1889 to 1907 contributed in that time 522 separate titles to scientific literature.

Weir Mitchell's first contribution was in 1852 on "The Various Forms of Uric Acid Crystals." From that time until the laboratory period was well under way there was no one so original and able as he. Most of his suggestions for research arose from his clinical experience. He was the first great example of that class of internists, now happily somewhat common, who focus light on their problem from the experimental laboratory as well as from their clinical experience. Mitchell never wrote endless speculations as was the custom of the times but he gave himself up to experiment and analysis for his solution.

It would be a difficult thing in a review as brief as this to cite all the contributions Mitchell made to general physiology. The following certainly should be mentioned. Early in his career he became interested in snake venoms. In 1860 he published a paper on rattlesnake venom in the Smithsonian Contributions to Knowledge. These papers were followed at intervals by others which culminated in the well-known article with Reichert in 1886 on "Researches on the Venom of Poisonous Serpents." It was in this that attention was directed to the presence of toxic albumins. This work has therefore been the starting point for numerous investigations in toxicology and in immunology.

As a result of his Civil War experience, he was able to present a volume on "Injuries to Nerves and Their Consequences." His knowledge of the peripheral nervous system and sense organs was profound. He showed that cutting a cutaneous nerve did not destroy all sensibility and that sense areas overlap, in all of which he preceded the best of modern work. In a series of papers in the *American Journal of the Medical Sciences* he contributed a well-known investigation on the knee-jerk and its reinforcement.

The researches of Mitchell on the functions of the cerebellum placed him in line with the most distinguished experimental physiologists. His experiments numbering over three hundred and fifty were performed on pigeons, rabbits and guinea pigs and were mainly of three sorts: ablation, freezing, and irritation of the cerebellum. He pointed out the vicarious functioning of other parts of the central nervous system after cerebellar removal. As a result of these experiments, he proposed his well-known augmentor theory for the function of this most perplexing organ. The work of Luciani, one of the greatest of all authorities on the cerebellum, has followed along the lines first blazed out by Weir Mitchell.

Among all those so far mentioned, it is probable that no one gave as strong an impetus toward the development of the experimental physiological laboratory as Weir Mitchell. The faith with which this renowned man turned to the laboratory for the solution of his clinical problems gave physiology an importance in the eyes of medical men that it had not possessed.

Very seldom can historical periods be marked off by exact dates since both events and men are found connecting them. John Call Dalton (1825–1889) was such a connecting link between the pre-laboratory and the laboratory days in physiology. It might be said with much truth that for a time he, himself, was the laboratory period. Dalton was the first American to devote his time exclusively to physiology. Weir Mitchell has called him our "first professional physiologist."

Dalton took his M.D. at Harvard in 1847. He learned to experiment under Claude Bernard. He tells once of saying to his great teacher "I think it must be so," and Bernard replied, "Think! Why think when you can experiment!" In 1851 Dalton wrote his well-known paper on the "Corpus Luteum of Pregnancy" which obtained the prize offered by the American Medical Association and it gave him a great reputation. In 1852 he became professor of physiology at the Medical School of the University of Buffalo. From 1854 to 1859 he was at the University of Vermont and from 1859 to 1861 at the Long Island College Hospital. From 1855 he had also held an appointment at the College of Physicians and Surgeons in New York as professor of physiology and microscopic anatomy. From 1861 to 1864, he served as surgeon in the army. For the next nineteen years he was continuously at his post as professor of physiology in the College of Physicians and Surgeons. This position he resigned in 1883 to become president of the institution.

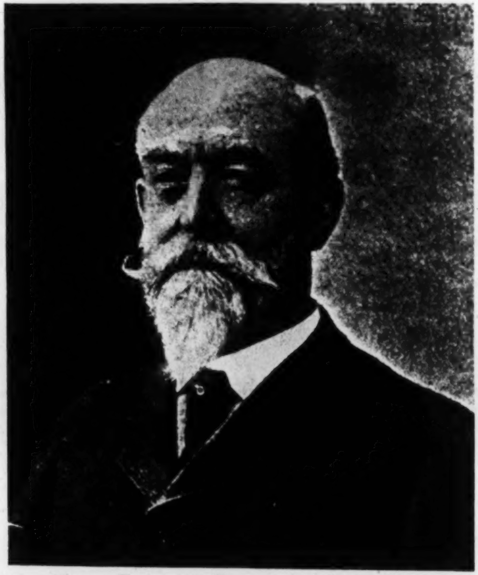
JOHN CALL DALTON (1825–1889).

Dalton's work although not great in quantity was all of a very high character. By means of a duodenal fistula he studied the secretion of the bile. He thoroughly investigated the formation of sugar by the liver and his reply to Pavy rescued Bernard's theories from doubt and from that time on the glycogenetic function of the liver has never been questioned. His spectral methods of examining organic solutions were also noteworthy. In 1885, he published his "Topographical Anatomy of the Brain" which was limited to 250 copies. This is one of the most handsomely illustrated of all anatomical works.

As a teacher and lecturer, Dalton enjoyed a wide reputation. He is said to have had the teaching instinct, always thinking of his class and the questioning faces, but never of himself. His "chalk talks" were famous and as a demonstrator, he had few equals. We have reproduced a sketch of Dalton lecturing on the nervous system made by one of his industrious pupils. He was a keen student of all the related sciences and he had a great love of literature. Much of this has been reflected in his "Human Physiology" the almost universal American text for many years.

JOHN CALL DALTON LECTURING ON THE CENTRAL NERVOUS SYSTEM. FROM A SKETCH MADE BY ONE OF HIS STUDENTS. (REPRODUCED FROM SHRADY'S COLLEGE OF PHYSICIANS AND SURGEONS, NEW YORK.)

Dalton is said to have been present at the first ether demonstration. Certainly he was quick to see that this anesthetic offered great opportunities for illustrating his lectures with experiments on living animals. Until his time, Weir Mitchell remarks that a physiological lecture was like hearing of a foreign land which you were forbidden to enter. Dalton entered, and his lectures at the University of Buffalo, were the first ever given in America that were illustrated by vivisection experiments. This method of teaching met much opposition, and for many years Dalton was kept busy appearing before societies, committees and legislatures in defense of such instruction. He maintained that such experimentation was essentially humane and necessary for the advancement of medicine. His logic, earnestness, and fiery spirit finally overcame all opposition. Science owes him much for the battles he won. As a result of these controversies he published his well-known work "The Experimental Method in Medicine."


Henry Pickering Bowditch (1840–1911).

To Dalton must be given the credit of having established the first permanent physiological laboratory in America. It was, however, essentially a private laboratory. It was not for students, nor did the laboratory attract a body of workers or produce a concerted series of investigations such as characterized Harvard and Hopkins. It was not until 1887 that Dalton's old laboratory was expanded and organized in the modern sense. In 1891 a course of laboratory demonstrations was given the medical students at Columbia, but it was not until 1903 that laboratory work was required.

The extensive organization for the experimental study and teaching of function which we now recognize as the modern physiological laboratory was first developed in America at Harvard University and shortly afterwards at Johns Hopkins. In a general way the establishment of the Harvard laboratory was due to the summating influences of all the physiological work ever done in America. Gradually the Harvard course in physiology became enlarged and elaborated. In 1870 Dr. William Thompson Lusk gave a course accompanied by experimental demonstrations, the first of its kind at Harvard. The establishment of the laboratory however was due to the enthusiasm and insight of one man, Henry Pickering Bowditch (1840–1911).

Bowditch was born in Boston in 1840. He graduated from Harvard in 1861 and at once joined the army, rising in 1865 to the rank of major. In the fall of 1865, he entered the Lawrence Scientific School, transferring a little later to the medical school from which he graduated in 1868. He immediately went abroad to study physiology. We do not know the influences that prompted him to enter this field for his life's work, but that he meant to prepare himself fully is evident from his going to the laboratories of two of the greatest physiologists of all time; Claude Bernard in Paris and Carl Ludwig in Leipzig. Ludwig influenced him more than Bernard and in the Leipzig laboratory he became intimate with a group of young men who were destined to play a great part throughout the whole world in the development of the experimental medical sciences. Among those youths who maintained a lifelong friendship in memory of the happy Leipzig days were Mosso, Cyon, Kronecker, Brunton and Lankester.

Dr. Bowditch returned home in 1871, and

was at once made assistant professor of physiology in the Harvard Medical School. On being asked once whom he was assisting, he replied that he was assisting himself. For a time this was literally true. Bowditch at once began to create a physiological atmosphere and a laboratory. For the latter, he was given two rooms in the attic of the medical school building. These he fitted with apparatus, much of which had been brought from Germany at his own expense. This was the first physiological laboratory in the United States designed for the use of any student who had a problem he wished to solve. Bowditch's breadth of view was shown by his welcoming every phase of experimental work. It was here that Minot began his celebrated career. It was here that Ott first worked in pharmacology, Warren in experimental pathology, Lombard in physiology and G. Stanley Hall in psychology. The hospitality of those attic rooms was unbounded; indeed the first bacteriological work of importance in America was done there.

All of this was made possible not only by Bowditch's radiating personality but by the influence that emanated from his own scientific endeavors. His first paper published while at Leipzig was a classic in that it described for the first time the "all or none" law and "treppe" of heart muscle. Bowditch's total list of publications numbers only 36 but all of the work is high grade and time has shown the clearness of his judgment. His work on the vasomotors, the knee-jerk, the nature of the nerve impulse and unfatigability of nerve all added luster to his reputation. He also possessed a great amount of mechanical, inventive ability and a number of important appliances bore his name. He designed the spring recorder for plethysmographs, the rotating secondary coil, and the Bowditch time clock. He first suggested simultaneous records for the kymograph, a suggestion which is said to have first directed Carl Ludwig's attention to him.

Although the Harvard laboratory had many advanced workers it was not until 1891 that a laboratory course was offered the medical students. The year following this course was required.

Bowditch's relations to medicine were not confined by any means to his purely professional work. From the time of his appointment as full professor in 1876, he was influential in providing for the physical needs of the Harvard Medical School. He was among those most prominent in securing the new buildings at Boylston and Exeter Streets and later he became an enthusiastic promoter for the present magnificent Harvard plant. One of his last public appearances was at the dedication of the New Harvard School Buildings, where clad in the scarlet robes of his Edinburgh doctorate, with Dr. Warren by his side, he made a fitting center to the striking scene.

Dr. Bowditch served as dean of the Harvard Medical School from 1883 to 1893 and during this time he exerted a great influence on medical education throughout the whole United States. Bacteriology, under his leadership was introduced as a regular study, a pioneer venture, the wisdom of which has been abundantly justified. He also worked unceasingly for the four year medical course which has now been universally adopted.

Another great service which Bowditch performed for medical research was his defense of animal experimentation. Boston was a center of anti-vivisectionists but under Bowditch's leadership their misguided zeal was overcome. His address on "The Advancement of Medicine by Research" is an able presentation of the fallacious arguments used by anti-experimentalists and a statement of the very great animal benefits which have been secured by experimentation.

Bowditch was a kindly, courteous, single-minded, forward-looking man, a natural leader. Physiologists may indeed be proud of him as one of the American founders of their science.

When President Gilman of Johns Hopkins was selecting men for his faculty he chose for the chair of biology, a young Englishman who was a student of Huxley's, by name, Henry Newell Martin (1848–1896). Martin though versed in all biology was essentially a physiologist. It thus came about that during the years Bowditch was establishing a laboratory at Harvard, Martin was doing the same at Hopkins. The Hopkins laboratory opened in 1876, and being a very novel and promising feature, at once attracted a considerable number of young students who earnestly sought to attack biology from the experimental side. The medical school had not yet been founded and Martin's work was all a part of the regular collegiate course. Among those inspired and trained by Martin may be mentioned Councilman, Sternberg, Brooks, Sewall and Howell. When the American Physiological Society was formed, seven of the original twenty-four members had been students of Martin. All this attests to the very wide influence he exerted on the development of physiology. Dr. Howell[1] aptly says,

Henry Newell Martin (1849–1896).

> Like Bowditch, and indeed in cooperation with him, Martin was actively interested in all the larger projects for developing and organizing a spirit of research among those interested in physiological science, and to these two men more than to any others we owe the creation of the present strong group of investigators in this subject.

Sewall, one of his best beloved and most promising students, returned to the University of Michigan, and there in 1887 offered an optional laboratory course in physiology, the first of its kind ever given in an American medical school.

Martin was an active investigator. The papers appearing from his laboratory were always of the highest quality. His own work in devising a form of perfusion for the isolated heart ranks possibly as the greatest single contribution ever made from an American physiological laboratory. Sewall tells graphically of the morning in 1880 when Martin arrived at the laboratory remarking, "I could not sleep last night and the thought came to me that the problem of isolating the mammalian heart might be solved by getting a return circulation through the coronary vessels." At the close of the day they made the experiment successfully. Martin realized the importance of his discovery and the excellent papers on the influence of variations in temperature and pressure on pulse rate followed. It was fourteen years later that Langendorff improved the method somewhat and published a long series of observations many of which had been observed by Martin long before. Martin also settled the dispute in regard to the function of the intercostal muscles by ingeniously noting whether they contracted at the same time as the diaphragm. He also measured the coronary blood pressure directly although Cohnheim had said a coronary could not be occluded without sudden death. In 1883 Martin was invited to give the Croonian lecture and in 1885 he was elected a Fellow of the Royal Society.

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[1] The writer wishes to acknowledge gratefully the valuable help received from a manuscript by Dr. W. H. Howell entitled "A Sketch of the History of American Physiology."

Personally Martin was somewhat under medium size. He had an engaging manner, a simplicity and frankness which attracted his elementary students at once. With his advanced students he was more reserved, at least until they showed that they had interest and ability. On their showing pluck and perseverance no one could have been more helpful. He rarely referred to his own researches, and he always hoped that his method of perfusion might be known as the "Baltimore method."

In the latter part of the eighties, Martin's health began to fail. In 1893 he gave a few lectures at the opening of the medical school, but soon resigned and returned to England, a broken man. He died in 1896 at the early age of forty-eight years.

With the establishment of the Harvard and Johns Hopkins laboratories, our labor as historian of the Beginnings of Physiology may be said to be ended. From these two laboratories there flowed a steady stream of research and trained workers. School after school installed experimental laboratories until it may be said without exaggeration that the United States has the largest and best equipped laboratories in the world. We should be boastful and probably not entirely truthful if we claimed the greatest physiologists in the world, but throughout the years the quantity and quality of research has steadily improved. All this we owe to those scattered workers who for many years kept the torch alight, but more particularly to those broad-minded, farseeing physiologists, the initiators of the laboratory period, Henry Pickering Bowditch of Boston and Henry Newell Martin of London.

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JEAN MARTIN CHARCOT*

A SUMMARY OF HIS LIFE AND WORKS

By B. BARKER BEESON, M.D.

CHICAGO

JEAN Martin Charcot, one of the most striking figures in medicine, was born in Paris in the Cité Trévise, a short street just off rue Richer, on November twenty-ninth, 1825. His father conducted a small coach-building establishment. The subject of our sketch was the oldest of four boys. They were all enrolled in the Bonaparte Academy for some months with the understanding that he who stood highest would be given further education, while the others would return to the workbench. Jean Martin emerged triumphant, completed his preparatory studies and after considerable hesitation between the fine arts and medicine he chose the latter as his life work. Far from being jealous, his brothers, seeing in him the hope of the family, did all in their power to aid his efforts. The story has been told that they even took turns in warming the tiny ice-cold room where he studied by placing there a red hot iron ball contained in a bucketful of sand.

Charcot's medical studies began in 1844. Four years later he was an intern in the Parisian hospitals, beginning his service at Salpêtrière. His thesis was entitled, "A Study Designed to Serve as a History of the Affection Described Under the Names of Primary Asthenic Gout, Nodosities of the Joints and the Primary Form of Chronic Articular Rheumatism." Charcot was chief of the clinic in the Paris Faculty of Medicine, in 1853. Three years later, at the early age of thirty-one, he conquered the difficult concours and was appointed Médecin des Hôpitaux de Paris. In 1857 he undertook to become Professeur agrégé with a thesis on expectation in medicine but was unsuccessful. He tried three years later and succeeded, thanks in a large measure to his teacher, Rayer. This second aggregation thesis dealt with chronic pneumonia. He was chosen Professor of Pathological Anatomy in 1872, succeeding his friend, Vulpian. That same year the Academy of Medicine admitted him to its ranks and in 1883 he became a member of the Academy of Sciences.

His dearest wish was realized in 1882 when the chair of nervous diseases was created and he was named as its first occupant. In 1866 de Lavalette, Minister of the Interior, tried to induce the Minister of Public Instruction to create a second chair of internal pathology to be occupied by Charcot. On the margin of the final report in this matter was written, "Reply to M. de Lavalette with a letter which he can show to M. Charcot." To Jules Ferry, then Minister of Public Instruction, belongs much credit for the creation of the chair of neurology of which Charcot publicly assumed charge on January second, 1882. In the course of his inaugural lesson he said, "In the solution of the problems which are imposed upon us all the branches of biological science must give a mutual support and thus controlling one another march in unison to the same goal. But I maintain that in this concert the preponderant rôle, as the court of last resort, should always belong to clinical observation."

Charcot's earlier studies dealt particularly with the more chronic disorders so frequent at Salpêtrière. Among them he emphasized chronic rheumatism, pulmonary scleroses, pneumoconioses, the chronic pneumonias, as well as diseases of the liver and kidneys. These subjects formed a portion of those

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* Read at a joint meeting of the Institute of Medicine and the Society of Medical History of Chicago, March 18, 1927.

Charcot taught as professor of pathological anatomy.

In his oration at the Sorbonne during the recent celebration of the centenary of Charcot's birth, Babinski stated that along with Vulpian, Charcot was the first to make an anatomo-pathological study of ulceration of the tricuspid valve in typhoid fever. Later he emphasized the importance of ulcerative endocarditis. Babinski also quoted him as having first diagnosed a case of exophthalmic goiter in France. Charcot said,

> I was the first to make this disorder known in France when in 1856 I showed such a case to Professor Piorry, saying to him "Here is a disease which we do not know; it is that disorder described by Basedow in Germany and by Graves in England. It is characterized by palpitation of the heart, an acceleration of the pulse and a protrusion of the eyes."

To which Piorry replied that "I was an ontologist and furthermore that a woman could have a goiter along with cardiac palpitation without it being a special disease."

About this time Charcot described the crystals which bear his name. Little by little he was being irresistibly drawn toward neurology. With Bouchard he described the miliary aneurisms of the nervous centers in 1868, and about the same time he wrote about multiple sclerosis, being credited with having first diagnosed it in the living subject. Later he studied the senile tremor, paralysis agitans, etc.

Having seen numerous examples of localized cortical epilepsy Charcot very courteously termed them "Jacksonian epilepsy" after having learned that Hughlings Jackson had already described such cases. He stated that aside from a tumor or tuberculous meningitis this form of epilepsy was most often due to a localized syphilitic cortical lesion and that he had obtained some marked results in these cases with mercurial inunctions.

His studies on cerebral localization (1876) are among his best known works. He devoted much time to the study of the internal capsule and gave excellent descriptions of the various syndromes resulting from its involvement, among them hemiplegia, hemianesthesia, hemichorea, contracture, etc. According to Babinski, Charcot and Vulpian described foot clonus in 1862.

The muscular atrophies were thoroughly studied by Charcot who, in collaboration with Pierre Marie, first called attention to a particular progressive type of muscular atrophy known as the Charcot-Marie-Tooth type (neurotic type). Amyotrophic lateral sclerosis was called "Maladie de Charcot" in recognition of the fact that he first described it.

In 1868 Charcot called attention to tabetic arthropathy, which has since then borne his name. Being invited to London he demonstrated specimens of tabetic joints and also spontaneous fractures occurring in that same disorder. Some of these were given to the Museum of the Royal College of Surgeons as well as to St. Thomas Hospital. From that time on he was very popular with English physicians.

Among other achievements may be briefly mentioned the completion of the description of Menière's syndrome in which he reported good results from quinine sulphate, the description of unusual types of locomotor ataxia especially those with laryngeal and gastric crises, and also painstaking studies of brain softening, encephalitis, compression of the spinal cord, and cerebral hemorrhage. Hysteria and hypnotism interested him exceedingly. Along with Parinaud he carried out researches on the visual fields and vision for colors in hysterical patients. In collaboration with Paul Richer he wrote a most interesting book on the deformed and diseased in art.

Charcot's complete works have been published in nine volumes which have gone through five editions besides being reprinted in 1892. They were translated into German, Russian, English, Italian, Magyar and Spanish; all within eight years. Besides this, two volumes of his Tuesday lessons were also printed from notes by his pupils, Blin, Charcot, Jr., and H. Colin. These covered the years 1887 to 1889, inclusive. A second edition appeared in 1892. In collaboration with Bouchard and Brissaud he sponsored a treatise on medicine which was eminently successful. With Pitres he wrote a book entitled, "The Cortical Motor Centers in Man" (1895).

Charcot was responsible for the founding of several journals, among them the "Archives of Neurology" (1880), the "Archives of Experimental Medicine and Pathological Anatomy" (1889), "Revue de Médecine" and the "New Iconography of Salpêtrière" (1888). He was a strong supporter of the "Progrès Médical."

Duchenne de Boulogne was greatly admired by Charcot, who was wont to term him "The great promoter of modern neurology." He often referred to Duchenne as his teacher and they were warm friends, as the following anecdote shows: during the Franco-Prussian War, Duchenne whose wife was English, wished to leave Paris before its investment by the Germans. This he did, entrusting his entire fortune of several hundred thousand francs to Charcot.

Charcot inaugurated a course on the diseases of old age in 1866 and it was a big success. Six years later he began the teaching of neurology, holding his first clinics on Sunday mornings, which were always largely attended. Later, when professor of neurology, he gave two clinics weekly besides the daily visit, which was largely devoted to the instruction of his pupils, interns and externs. The Tuesday clinics were largely impromptu, patients being examined before the audience so as to show his methods of procedure. His unerring eye enabled him to make many diagnoses almost at a glance. According to Léon Daudet an unfavorable prognosis was always given in Latin, thus, "Pronostic pessimum, exitus letalis et properatus."

The Friday lesson was devoted to some subject prepared with meticulous care. Charcot was always careful to give others due credit. As with Fournier and Dieulafoy, this lesson was the crowning event of the week. He employed the most scientific and recent methods of demonstration due to the advice and cooperation of Paul Regnard, at first his intern and later assistant to Paul Bert at the Sorbonne. Charcot was among the first to use photographs in his lectures. The Tuesday and Friday clinics were given in the amphitheater. On the other days he held forth in a small room close to the dispensary. Charcot was not an orator in the sense of flowery phrases and sweeping gestures, but he spoke with good elocution, without hesitation, and his phrases were clear and concise.

Among his former interns may be mentioned Bouchard, Cornil, Benjamin Ball, Debove, Raymond, Lépine, Hanot, Joffroy, Féré, Ballet, Brissaud, and Gilles de la Tourette, all of whom have passed away. Pierre Marie, Babinski, Pitres, Paul Richer, Henri Meige, Hallion, Achard and Souques are among his best known living ex-interns. Prevost, Pierret, Durêt and Menière were also pupils of Charcot. It is interesting to note that of the four occupants of the chair of neurology at Salpêtrière since his time, two of them, Raymond and Pierre Marie, were Charcot's pupils. Besides Frenchmen, many foreigners were and are proud to call him their teacher. Among them Freud, who frequented Salpêtrière in 1885 and 1886, often referred to Charcot's influence in the orientation of his personal researches. Minor, Kojewnikow, Dankschewitch, and Bechterew in Russia, Marinesco in Roumania, Christiansen in Denmark, Mettler and Allen Starr in our country were some of Charcot's foreign pupils.

His personality was a most striking one and he exercised a veritable fascination upon those about him. Marinesco said that Charcot made a more lasting impression upon him than did such other savants as Virchow, Koch and Ehrlich. Charcot combined, in Marinesco's opinion, a genius for observation, a remarkable talent for systematization and a strong inclination for the arts. We may recall in this connection that he was quite clever at sketching and has left behind some unusual representations of amusing incidents in both his professional and everyday life. There are also some sketches of his travels.

Dejerine, in his inaugural lesson as Raymond's successor on March thirty-first 1911, paid a high tribute to the memory of Charcot, dwelling upon his thoroughness and upon his conscientious work. "Charcot," he said, "was a genius but one with a conscience and that was characteristic of his career. He gave to French neurology the anatomo-clinical method and the idea of localization."

Charcot was of medium height, stocky build, and smooth shaven. His profile has been compared to a medallion of Dante or Bonaparte. Pierre Marie has likened his features to those of a Roman senator. His voice and manner were imperious and he brooked no contradiction. Cold to strangers, his intimates found him a jolly raconteur. Madame Charcot's affable smile and graciousness did much to thaw out his reserve. He adored his wife, son and daughter. He was kind to animals, especially dogs, horses and monkeys. He had two monkeys as pets. Reference to hunting or huntsmen were tabooed in his presence. Georges Guinon, who was among Charcot's most intimate pupils, in an interesting article entitled "Charcot Intimately," tells of his second pet monkey. This frolicsome little creature, Rosalie by name, sat at the family table in an infant's chair and nothing pleased Charcot more than to have Rosalie slyly take something from the table. Guinon also speaks of the Master's love for clowns and their pranks. Every year on the evening of Saint Martin's day, November eleventh, we are told that Charcot's children and their intimate friends, among them two young English women and certain of his pupils, devised some sort of a farce for his amusement. After the midnight collation only the intimates remained and they literally turned the great mansion upside down. Charcot would exhort them to leave him in peace, uttering threats which the twinkle in his eye belied. He would say, "Ah, those savages there, they do not know enough to go." And then referring especially to his pupils he would add, "If they do not go at once I shall arrive at Salpêtrière before my usual hour tomorrow morning and then we shall see. Ah, let them go to the devil, I am going to bed." When he had been given time to retire they would burst into his room and dance around the bed giving vent to Indian war whoops. At this Charcot would burst into laughter and throw his bed slippers at them. Finally the "savages" would consent to leave the home where everyone had passed a most delightful evening.

It has been said that of the foreigners he preferred Englishmen and Russians, but disliked Germans.

A remarkable worker, he was never entirely satisfied with the fruits of his labor. When interested in some problem he would forget his meals, rest and everything else. His scheme for showing the various types of aphasia is said to have taken up most of his nights for three months. His erudition was almost without bounds. Besides his native tongue, he read with ease, English, German, Italian and Spanish. His favorite poets were Eschylus, Shakespeare and Dante. He was also fond of the Greek philosophers. Racine, Balzac and Molière were frequently quoted in his clinics. A profound admirer of Beethoven, he detested Wagner. A lover of art, he had visited most of the European galleries.

Charcot was generous and entertained lavishly. Every Tuesday evening he held open house and those best known in medicine, the arts, literature and even politics were to be found in his salons. At such times he banished all reference to medicine and insisted on plenty of music and gaiety.

He was often indulgent with the poor patients of his service, but frequently exhibited a ferocious sort of sarcasm and a Rabelaisian manner with those composing his private clientele. Naturally he had a tremendous following, patients coming from all parts of the globe to consult the master neurologist. Guinon said that frequently there was such a throng that Charcot took lunch in his bathroom.

He was an early supporter of Pasteur and Calmette, as a pupil of Louis Pasteur, paid him a high tribute during the recent Charcot centennial celebration. In 1885, when Pasteur was being assailed on all sides and on account of his health had been compelled to sojourn among the Italian Lakes, Charcot very unexpectedly appeared one afternoon at Pasteur's laboratory in rue d'Ulm. He demanded that Roux, Pasteur's co-worker, should fully explain to him the master chemist's ideas as well as the experiments on which the treatment of rabies was based. The scene took place in a tiny vestibule just off Pasteur's laboratory. Seated at a table, face to face with Roux, Charcot listened in silence for more than an hour. When Roux had finished he left without a word. A few days later at the Academy of Medicine he delivered a notable speech in favor of Pasteur and routed his opponents. This aroused much feeling against him and he was scurrilously attacked in a most vindictive anonymous article. Some years later, being asked to call upon a paralytic, and at that time he called only upon the indigent, he went and ascertained that the patient was none other than the author of the article just referred to, the attack having been financed by three of Charcot's colleagues. Having made his confession the patient asked if Charcot was still willing to treat him. "Most assuredly," said he, "but this time there will be no question of a fee."

Early in his career Charcot lived in rue Laffitte, later on the left bank of the Seine in Quai Malaquais and finally at 217 Boulevard Saint-Germain, where he secured a sumptuous home and garden close to his old friend, Alphonse Daudet, who lived at 31 rue de Bellechasse. His study and library which, as is the case with most French physicians, served also for his consultations, was truly immense. It was surrounded by a two-storied gallery, the whole being patterned after the Medici Library in the Convent of San Lorenzo at Florence. It contained a most extraordinary collection of books, medical and otherwise, which has appropriately been given to the neurological clinic at Salpêtrière by his son, Dr. Jean B. Charcot. Originally a physician, he is now one of the best known Polar explorers, his voyages in the "Pourquoi Pas" being historic.

Guinon, who was Charcot's last secretary acting in that capacity from 1889 up to the time of the master's demise, having succeeded Pierre Marie, emphasizes his lack of commercialism. Guinon's duties consisted chiefly in helping him with his private patients, all of whom he examined thoroughly before sending them in to Charcot. Not infrequently someone would return to Guinon and ask what the fee was since Charcot had forgotten all about it. When all had been seen Guinon was wont to carefully explore the master's large library table, for there he always found a number of louis arranged in twos, since at that time a visit to Charcot cost forty francs. In later years he dreaded out-of-town consultations and we are told of a wealthy Russian who first wished him to come to Russia and diagnose his case, but failing in this he came to Switzerland where Charcot finally visited him and charged two thousand francs.

In a speech delivered during the Charcot centennial celebration Guillain, the present professor of neurology in the Paris Faculty of Medicine, related a story which shows Charcot in a most genial vein. Wishing to know what took place in the intern quarters at Salpêtrière where he had himself lived, he inquired of his son, then serving as his intern. This resulted in the interns inviting him for dinner on the following evening. Thanks to the illustrious patron, the repast became a very boisterous affair, so much so that the director of the hospice, a most indulgent man, deemed it necessary to interfere. Imagine his utter confusion when he was received at the entrance of the interns' quarters by no less a person than Professor Charcot himself holding aloft a glass of champagne. Needless to say, the director made a hasty retreat.

Charcot's early pathological studies were carried out in spite of the greatest handicaps. His original laboratory had been a tiny kitchen and was just under the eaves, next to a cancer ward. Later his well-appointed service was a revelation to all. He believed that a teacher should do original work and also create a group of pupils, doing both of these admirably himself. It would indeed be difficult to find anyone with a larger number of illustrious pupils than he.

In his vivid Souvenirs Léon Daudet, the son of Alphonse, writes much about Charcot, having known him and his family most intimately. He emphasized Charcot's fondness for children and his indulgence with their pranks. When visiting with his cronies, among them Alphonse Daudet, Vulpian, Falguière, Cardinal Lavigerie, Waldeck-Rousseau and Dom Pedro, the last Emperor of Brazil, Charcot would often dismiss from the room those ladies who might be present by announcing that the clinic was open. Then he would tell stories or relate medical experiences, of which the following is vouched for by Leon Daudet: "One of my most famous colleagues, a German, took a long trip in order to explain his case to me," said Charcot. "It was no laughing matter, but a sudden and very characteristic sexual inversion caused by a too long contemplation of a tiny fawn of the Renaissance which stood on his study table. So you see gentlemen, these masterpieces have their dangers," he added with a smile. "But Charcot, how did you treat this unfortunate man?" asked Alphonse Daudet. "Pooh," replied he, "I advised him to try the women if it was still possible, but you must remember he was fifty-five years old, a German and from the country of Winckelmann."

Charcot exerted a strong influence upon a number of well-known French writers. Alphonse Daudet dedicated the "Evangelist" to him. Jules and Edmond de Goncourt in "Sister Philomena," Zola in "Rougon Macquart," Guy de Maupassant in "Him and Who Knows," Octave Mirabeau in "The Diary of a Chambermaid" as well as in "The Twenty-eight Days of a Neurasthenic," and Paul Bourget in "André Cornelis," all showed evidence of association with him.

By 1890 he was at the zenith of his reputation. Hardly a work on neurology appeared for which the author did not solicit his patronage. Patients from all parts of the globe thronged his consultation rooms. This was the moment chosen by that implacable disorder which he had so often diagnosed in others to first mark him as its victim. For the account of this incident I am indebted to Léon Daudet.

> It was after a very lively party at Charcot's during which he had been unusually affable that as he retired to his bedroom he became very pale, uttered a muffled groan, pressed both hands to his chest and sank into a chair without a word. It was then two o'clock in the morning.

Young Daudet rushed across the street to get Potain, then professor of internal medicine in the Paris Faculty. About to retire, he hurried to the bedside of his illustrious colleague, insisting that they be left alone. A quarter of an hour later he emerged. "It was nothing," he said, "nothing at all, only a slight gastric disturbance." Daudet, however, noted Potain's haste in reassuring those present and also a certain trick of his of plunging both hands into his pockets and opening his eyes wide, which always indicated the most grave preoccupation on his part. As Daudet escorted Potain home he said that it had been necessary to reassure Charcot, who believed his attack to have been one of angina pectoris. "He was right," added Potain, who by this time was at his doorstep. As Daudet writes, he was greatly shocked at hearing this death sentence pronounced by the master of cardiac diseases. Trembling with fright and cold, for it was mid-winter, he asked, "How long Sir?" "Two years, two years and a half at the most," whispered Potain, "but be silent about it dear friend."

The next day Charcot was again himself and laughed at the fears of his family and friends. Daudet says that he wondered if Potain had really duped him or whether such only appeared to be the case. This much is true that about two and one-half years later he passed away.

In the summer of 1893 Charcot was obliged to give up work and take a real vacation. With his friends, Debove and Strauss, he went to the Morvan district for a few days and improved, but died suddenly during the night of August sixteenth 1893, from an acute attack of pulmonary edema. The little hotel where he passed away on the shore of Lac des Lettons bears a bronze tablet to his memory. His remains were brought to Salpêtrière, where they laid in state all night in the chapel before being interred in Père Lachaise Cemetery.

At one of the gatherings in honor of the one hundredth anniversary of Charcot's birth his son, in an impromptu speech, said,

> When I heard of the tragic death of my friend Scott, the greatest of all Polar explorers, I wrote a letter of condolence to his mother. In a touching reply she said, "They speak of his glory, but for my part I can see only one thing, that he was my son." In the same way I say to you this evening that in this great man whose memory you have gathered to honor, I wish only to see my father.

Thus lived and died a truly self-made man, who by a supreme effort rose from a humble position to one of world-wide renown. Ought not such a career to teach everyone the value of unceasing conscientious effort?

SIR THOMAS BROWNE AND THE WITCHES*

By JAMES HENDRIE LLOYD, M.D.

PHILADELPHIA

SIR Thomas Browne, author of the "Religio Medici," once appeared in court as a witness against two women on trial for witchcraft; and it was largely on the strength of his testimony that they were found guilty and condemned. At this very period the whole detestable superstition had been exposed by critical writers, such as Reginald Scot and Wierus, so it seems that Sir Thomas Browne had not much excuse for his credulity. He still shared the stupendous delusion which for so many centuries dominated the thoughts, beliefs and practices of this dear old human race of ours; and in spite of all this he gave us his philosophical and moral prosings, which have gained for him the reputation of a medical pundit.

The case is worth looking at if for no other reason than that it displays the large capacity of the human mind for the storage of queer notions. For at this distance of time this looks like a queer notion for a man like Sir Thomas to have entertained, although to the two victims it must have seemed not so queer as tragic.

At the time of the trial (1664) Browne was nearly sixty years old, and had attained a great reputation as a physician and writer. He practiced in Norwich, a provincial city which had some claims to distinction as a place of culture; and he had long since written not only the "Religio Medici" but also his work on "Vulgar Errors" and, more recently, his "Urn Burial," upon which three works mainly rests his fame. He became soon after an Honorary Fellow of the London College of Physicians, and later contributed papers to the Royal Society, of which, however, he seems not to have been a Fellow. His scientific curiosity was insatiable; his reading was extensive; and he kept common-place books in which he jotted down all that he saw, heard or read that interested him. Withal, he impresses us as being something of a compiler; but he was liberal minded and even sceptical, so we should hardly be prepared to see him go witch-hunting, if he had not told us himself that in divinity he "loved to keep the road." A belief in witches was evidently a part of his divinity.[1]

The two women, Rose Cullender and Amy Duny, were indicted for bewitching some children, and the chief evidence against them was given by their parents, relatives and neighbors.[2] The children were evidently hysterical perverts, who had fits, hysterical paralyses, blindness, and vomiting of pins and nails. This so-called evidence was of the flimsiest kind; the product of suggestion, malice, ignorance and superstition. It was so flimsy that one of the lawyers, Mr. Sergeant Keeling, was much dissatisfied with it, and thought it not sufficient to convict the prisoners; and he said that if such evidence were allowed, only upon the imagination of the parties afflicted, no person whatever could be in safety, for they might accuse anyone, who might be altogether innocent. These were the only rational words spoken in the court, and they were spoken by a lawyer; except that a group of gentlemen who were asked by the Court to examine one of these youngsters, protested after their examination that "they did believe the whole transaction of this business was a meer imposture."

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*Read before the Section on Medical History of the College of Physicians of Philadelphia, January 17, 1928.

[1] See Wilkins' preface to the Pseudodoxia in his edition of Sir Thomas Browne's Works, Vol. 11, p. 164. Also his Supplementary Memoir, Vol. 1.

[2] A Tryal of Witches, at the Assizes held at Bury St. Edmunds for the County of Suffolk; on the Tenth Day of March, 1664, before Sir Matthew Hale, Kt, then Lord Chief Baron of His Majesty's Court of Exchequer. Reprinted verbatim from the original edition of 1682. With an Appendix by C. Clark Esq. London, 1838.

The writer of the present paper is indebted to Miss M. C. Klingelsmith, Librarian of the Biddle Law Library, University of Pennsylvania, for the opportunity to see a copy of the report of this trial.

Nevertheless, Dr. Browne (who was not yet Sir Thomas) took the stand and delivered himself of the following remarkable opinion.

> He was clearly of the opinion that the persons were bewitched; and said, that in Denmark there had been lately a great discovery of witches, who used the very same way of Afflicting Persons, by conveying Pins into them, and crooked as these Pins were, with Needles and Nails. And his opinion was, That the Devil in such cases did work upon the bodies of Men and Women, upon a Natural Foundation, (that is) to stir up and excite such humours superabounding in their Bodies to a great excess, whereby he did in an extraordinary manner Afflict them with such Distempers as their bodies were most subject to, as particularly appeared in these Children; for he conceived that these swouning Fits were Natural, and nothing else but that they call the Mother, but only heightened to a great excess by the subtlety of the Devil, co-operating with the Malice of these which we term Witches, at whose Instance he doth these Villanies.

This opinion calls for no comment, unless it be to note that it contains more words than sense.

The trial, according to the report, must have been brief. No witnesses were examined on behalf of the accused women, and they were not represented by counsel, because in those days the common law of England did not allow counsel for persons accused of felony. The judge, Sir Matthew Hale, when he charged the jury, said he made no doubt that there were such creatures as Witches, and told the twelve men to observe strictly the evidence. As this was nearly all one way, the jury, after deliberating a half-hour, brought in a verdict of guilty; and the two women were hanged about one week later.

This ghastly trial has probably few parallels even in the bloody annals of the English Criminal Law. It can only be matched in its atrocity by some of the worst orgies of witch-hunting in the Middle Ages; and for the medical profession it has an ugly distinction as the scene of the demoniacal outburst of the author of the "Religio Medici."[2a]

Sir Thomas Browne has had his apologists, and many of them have been his warm admirers, although probably few of them believed in witches. In the first place, he was an expert witness for the Crown, and doubtless knew what was expected of him, which was to help to secure a verdict of guilty. His editor, Wilkin, thinks that if he believed in witches he was entirely justified in testifying as he did. Moreover, in this belief he was in good company, and his editor points to Lord Bacon, Lord Chief Justice Hale, Bishop Hall, and others.[3] But it is a rather curious fact that all three of his early biographers omit to mention this gruesome episode in his career, as though they were not proud of it; although it would seem that it might have been a tempting subject for the pen of Dr. Samuel Johnson, who wrote one of these lives.[4]

Witchcraft had long held its own in England, and had been a penal offense for many years. C. Clark, Esquire, who wrote an Appendix to the report of this trial, tells us that the first trial "of any note" for witchcraft took place in 1593. A statute was passed in the first year of James I for the punishment of "these detestable slaves of the devil." The number executed during the next century amounted to 3192; but Barrington does not hesitate to estimate the total number of those put to death in England on the charge of witchcraft at

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[2a] Lecky, W. E. H. History of Rationalism in Europe. Chapter on "Witchcraft and Magic," I, 101, *et seq.*

[3] Sir Thomas Browne's Works, Edited by Simon Wilkin, London, 1836, vol. I, 74.

[4] Johnson's *Life* is prefixed to Volume I of Wilkin's Edition.

30,000. There were witch-hunters on the scent. These men professed to be able to ferret out witches; they went from village to village, and were paid so much a head. One man and 15 women were executed at Newcastle in one batch. One of these witch-hunters himself came to the gallows, and confessed just before he was hanged that he had been the death of above 220 women for the gain of 20 shillings a piece. The catalogue of legal murders in England closes with the crowning atrocity of the hanging of a Mrs. Hicks and her daughter, a nine year old girl, in 1716, the penal statutes against witchcraft being repealed in 1736.[5]

Thus it appears that Sir Thomas Browne had plenty of precedents; but he came near the end of the moving picture, for after his time the trials seem rapidly to have diminished in number. His testimony, says Aikin, "had no small influence in occasioning the condemnation of the wretched victims, whose execution was one of the latest instances of the kind, by which the English annals are disgraced."[6] It is a pity that Sir Thomas had not lived a little later. As it is, he serves as a frightful example of an age that was passing.

He was, indeed, somewhat behind the best of his own times. In 1584, Reginald Scot had published his book on "The Discoverie of Witchcraft,"[7] "a very remarkable book, the object of which was to put an end to the cruel persecution of witches." We are told that it was a work of great learning and acuteness, written in a spirit of righteous indignation against witchmongers.[8] It was burnt by order of King James I, who was something of a pedant as well as a king, and wrote a foolish book on "Demonologie," to controvert Scot, in which he urged that the defence of insanity should be denied in the courts to those on trial for witchcraft. Sir Thomas Browne must have known of Scot's book, but he was evidently on the side of the king. In Germany the literary movement against this superstition had begun even earlier, and Wierus had written in 1563. But the dawn of reason had not yet broken upon the mind of Browne a full century later. A book which shows clearly the growing disbelief in witches in Browne's own day is John Webster's "Displaying of Supposed Witchcraft" wherein is affirmed that there are many sorts of "Deceivers and Imposters," and to win persons under a passive "Delusion of Melancholy and Fancy." Webster was a Practitioner of Physick in London, 1677.

Browne's primitive belief in the supernatural was not limited to the modern witches, but included even the ancient ones. He wrote a paper on the Oracle at Delphi and the answers given there by Apollo to Croesus, King of Lydia.[9] He considered the oracle as indubitably supernatural and, as Johnson says, "founds all his disquisition upon that postulate." His perfect conviction of the Satanic influence exerted in the oracles is strongly expressed also in a passage in the "Religio Medici," and is based on the alleged confession of the Devil himself in his oracle to Augustus.[10] This was also the belief of some of the early Christian writers; they did not deny the supernatural in the Pagan oracles, but imputed it to the demons. Sir Thomas, indeed, was so credulous that he believed not only in witchcraft but also in astrology, alchemy and magic; and he never abandoned the Ptolemaic system of astronomy.[11] For him the sun continued to revolve around the earth, and witches to stick pins in children.

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[5] See the Appendix to the "Tryal of Witches" for many instances. But witches were evidently persecuted long before 1593. Barrington's figures seem incredible; they are given here on the authority of Clark.

[6] Aikin, Biographical Dictionary, quoted by Wilkin, Supplementary Memoir, LXXXIII.

[7] This work, edited by Brinsley Nicholson, M.D. was reprinted in London, 1886.

[8] Encyclopedia Brittanica, XXI, 470.

[9] Browne's Works, Edited by Wilkin, Lond., 1836, vol. IV, 223.

[10] Johnson's Life, XXXVII. Also, footnote 2. Also, Religio Medici, Part I. Sect. XXIX, p. 42. Pseudodoxia Epidemica. Bk. VII. Cap. XII.

[11] Dictionary of National Biography, article on Sir T. B. Also Pseudodoxia Epidemica. Bk. VI. Cap. V.

There is a rather mysterious story about the first appearance of the "Religio Medici." The author, then only about thirty years old, had loaned the manuscript to a friend, and it was passed on from one hand to another, and the work was finally printed anonymously and surreptitiously. It aroused great interest and excited some controversy, and was animadverted on by Sir Kenelm Digby, a noted scholar. Some of the criticism had, indeed, been severe. Browne then brought out his own edition, claiming that the spurious edition had been mutilated. Dr. Johnson hints that Browne had been privy to the whole scheme. If so, he probably feared the reception which the work might have, because of some of the dubious opinions contained in it. He wanted to try out his public, and did this under the mask of anonymity; and when he found that the work had won extensive and, on the whole, favorable notice, he acknowledged it. Dr. Johnson's idea has been disputed, and may be taken for what it is worth, but it does suggest a characteristic of Browne's which is at least noteworthy. He delighted in paradoxes, subtleties, and quaint, even obscure, language; so he may also have delighted in a round-about-way of catching his readers. Moreover, he was still a young man and an untried author, and the learned world may have looked to him like a very formidable judge.

The success of the book seems to have been phenomenal, but its orthodoxy was suspected, and opinions about it and its author varied. Some said he was a Catholic, others a Protestant, and one reader even thought he was a Quaker. The work was promptly translated into Latin, and later into several modern languages. But the Latin translation was rejected in turn by three printers in Leyden, who feared it would get them in trouble with the authorities. Elsewhere on the Continent it was assailed as unorthodox, and Sir Thomas was called a deist and an infidel. The book was even placed on the "Index Expurgatorius," although the author proclaimed his Christian faith. All this may be explained by Browne's peculiar twists and turns and his involved style. He has been called a "Platonic Mystic," a writer who liked to play with ideas; or, as Johnson says, "a great scholar, turning his learning into amusement." It is sometimes hard to tell whether or not to take him seriously. The "Religio Medici" has been described as "a puzzle to contemporaries, and still hard to understand." It is probably more praised than read. Sir Thomas is of the type of the credulous sceptic or superstitious agnostic; a type which is not very rare.[12] He tells us himself in one place, where he writes almost like a freethinker, that he is "naturally inclined to that which misguided zeal terms superstition."[13] He sometimes runs with the hare and hunts with the hounds, as when in his testimony against the witches he said that the fits were natural but heightened by the devil. This was having things both ways. He even expresses a doubt in his commonplace books whether the parties accused of witchcraft had always been guilty.[14] In the field of science he was inquisitive rather than original, and it does not appear that he contributed much to medical knowledge. But as a humorist he has his points, as when he infers that Moses was the greatest autobiographer that ever lived, because he wrote the story not only of his own life but also of his own death; and again when he informs his readers that Adam was thirty years old at his creation. He also says that Adam had no navel, as he was not born of a woman. It is no wonder that Sir Thomas' orthodoxy fell under suspicion. The "Religio Medici" also contains a few indelicacies, some of which are evidently taken from Montaigne.

The reputation of Sir Thomas Browne has

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[12] Religio Medici, Wilkin's Edition, Part I. Sect. x, p. 14.

[13] Religio Medici, Wilkin's Edition, p. 14.

[14] Common Place Books, Wilkin's Ed. IV, 389.

suffered some changes. Not so very long after his time the Rev. Francis Hutchinson wrote a book on Witchcraft which was devoted to the discrediting of demonomania, and in which he handled Browne without gloves.[15] It is a carefully written monograph, showing evidence of wide research, invaluable for reference, and marking the reaction against this gross obsession in the early eighteenth century. Perhaps the most indignant voice has been raised in our own time. This was in 1904, when it was proposed in England to erect a memorial to the author of the "Religio Medici." This roused the wrath of Dr. Conolly Norman, a well-known Irish alienist. Whatever claims Sir Thomas Browne had to the admiration of scholars, he had no claim whatever, in Dr. Norman's opinion, to the respect of the medical profession. He was not a great physician, since he was neither scientific nor humane. For the proof of the first charge Dr. Norman referred to Browne's works, and for proof of the second to Browne's action in the trial of the witches. If a monument was to be erected, thought Dr. Norman, it ought to include also the figures of the innocent poor women who owed their death to the testimony given by the physician; and they might be introduced in the monument as supporters to the figure of Sir Thomas Browne. This protest, in a letter to the *British Medical Journal*, started a war of letter writers, whose various emotions, pro and con, may be traced today in their epistles.[16] Dr. Norman's severe judgment will probably not be approved by many readers of the "Religio Medici," but it serves to show how the fame of the distinguished author of that book has had to run the gantlet of criticism.[17]

Among the best known, as it is also perhaps the best liked, of Sir Thomas Browne's writings, is the book called "Pseudodoxia Epidemica," a treatise on Vulgar and Common Errors. It is replete with learning, humor and odd conceits, written in a characteristic style, and seems to be made up of the accumulations of scrap-books. We can only regret for the author's sake that he did not include among "Vulgar Errors" his own belief in witchcraft.

[From Boyle: Opera Omnia. Venetiis, 1697.]

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[15] An Historical Essay concerning Witchcraft, by Francis Hutchinson, D.D. London, MDCCXVIII. Chap. VIII.

[16] *British Medical Journal*, Aug. 20, 1904, 396; also same vol., 474, 620, 621, 777 and 952.

[17] For recent estimates see Sir Edmund Gosse's Life of Sir Thomas Browne in the English Men of Letters; and Sir William Osler's paper in his Alabama Student and Other Biographical Essays.

THE THREE MEIGS AND THEIR CONTRIBUTION TO PEDIATRICS

By A. LEVINSON, M.D.

CHICAGO

A MOST interesting medical trio is that of the three Meigs, father, son, and grandson. The name Meigs is intimately associated with the history of American pediatrics. However, most writers on the history of pediatrics usually make mention only of the contribution of John Forsyth Meigs, and pass over the other members of the Meigs family. I should like to call attention to the fact that not only John Forsyth Meigs, but his father, Charles Delucena Meigs, and his son, Arthur Vincent Meigs, also contributed in great measure to our knowledge of pediatrics in general, and of infant feeding in particular.

AMERICAN PEDIATRICS IN THE MIDDLE OF THE NINETEENTH CENTURY

It is interesting to note that both Charles Delucena, and John Forsyth Meigs, father and son, published their books on pediatrics within an interval of two years, the son, in 1848, and the father, in 1850. If one takes into consideration the status of pediatrics in America during the middle of the nineteenth century, one cannot but appreciate the great contributions made to pediatrics by the books of the two Meigs.

Pediatrics was still taught in the American medical schools as part of the course in obstetrics. Jacobi, who, a few years later, was to become the first professor of pediatrics in America, was a student at that time in the University of Göttingen. Rotch, who was destined to play a great rôle in American pediatrics, was born in 1849, a year after the publication of the book of John Forsyth Meigs.

An idea of the status of American pediatrics up to the middle of the nineteenth century may be gleaned from the well-written paper "The History of American Pediatrics before 1800" by Jacobi,[3] and from the following paragraph in Garrison's "History of Pediatrics"[2] in Abt's *System*. Garrison's statements are based on Samuel S. Adams' analysis of American pediatric literature up to 1896[1]:

> The outstanding items are the post-mortem sections of cholera infantum by James Stuart (1806), James Jackson (1812), William E. Horner (1829), and J. Lewis Smith (1858); Edward Miller's advocacy of cold bathing in fevers and cold clysters in tormina and tenesmus (1814), the pioneer brief for school hygiene by Edward Reynolds (1833), W. W. Gerhard's papers on smallpox (1832), measles (1833), tuberculous meningitis (1833), and pneumonia (1834) in children, Samuel Jackson's paper on cold water in malignant scarlatina (1833), John Watson's letter on surgical diseases of childhood (1853), Joseph O'Dwyer's device of intubation in diphtheritic croup (1879–86), and the pediatric treatises of "An American Matron" (1810), George Logan (1825), William P. Dewees (1825), which combats swaddling, the abuse of cradle-rocking, and the chewing of infant's food by the nurse, John Eberle (1833), who follows Dewees, James Stewart (1843), D. Francis Condie (1847), J. Forsyth Meigs (1848), Charles D. Meigs (1850), J. B. Beck on infant therapeutics (1849), and the later books of Jacobi, Smith, Keating, Starr, Rotch, and Holt.

In addition to the names mentioned above, some of which are of minor importance, one should add the outstanding contributions made to pediatrics by Benjamin Rush in his paper, "An Inquiry into the Cause and Cure of Cholera Infantum" (1773), Hezekiah Beardsley's report of a case of hypertrophic congenital stenosis of the pylorus (1788), which escaped attention until recently, when it was unearthed by

William Osler and John Foote, and Samuel Bard's paper on Angina Suffocativa (1771).

It can be seen from the above-mentioned facts that some isolated contributions had been made to pediatrics by American physicians before and during the middle of the nineteenth century, but that there was no American pediatric literature to which one could refer. An American in search of pediatric literature about the middle of the nineteenth century, either had to resort to the writings of Armstrong, Underwood, and Dewees, the only standard books on pediatrics, written in English, or he had to have recourse to French or German literature.

Both Charles Delucena and John Forsyth Meigs seem to have drawn very little on German sources, for they make constant reference to French authorities. The following excerpt from John Forsyth's book "Diseases of Children,"[18] gives a bird's-eye view of the most available English and French references:

> The work from which the author has drawn most largely, is that of MM. Rilliet and Barthez, which was originally intended to have formed the basis of the present treatise. This plan was, however, abandoned very soon after the commencement of the work, from the impossibility, with proper justice to these writers, of introducing either the personal experiences of the author, or a great amount of very useful material to be derived from other sources. He desires, however, distinctly to acknowledge his great indebtedness for valuable assistance obtained from their work, especially in regard to the symptomatology and morbid anatomy of several diseases brought under consideration.
>
> In addition, the author has constantly consulted the works of Underwood, Dewees, Eberle, Stewart, Condie, Billard, Barrier, Berton, Bouchut, Brachet, and Valleix, on the diseases of children; the portion of the Bibliothèque du Médecin Praticien, devoted to the same subjects; Tweedie's Library of Practical Medicine, Copland's Medical Dictionary, the Guide du Médecin Praticien of M. Valleix, and the Dictionnaire de Médecine Pratique. Various treatises on the practice of medicine, and different articles in the medical journals, which it is here unnecessary to mention in detail, have also been consulted and quoted.

Arthur V. Meigs, the son of John Forsyth, made more use of German literature than his father and grandfather. His main references, however, are English and French.

A biographic sketch and an evaluation of each of the Meigs follows.* In giving an evaluation of their work, we shall lay most stress on their pediatric views as compared with pediatric thought and practice of today. We shall, however, also throw some light on their general medical views and human characteristics, as gleaned from their writings.

I

CHARLES DELUCENA MEIGS

Charles Delucena Meigs (Fig. 1) was born in the Island of St. George's, Bermuda, February 19, 1792. He was the fifth of ten children born to Josiah Meigs, a descendant of Vincent Meigs who came to this country from England and settled in East Guilford, Connecticut about 1647 or 1648.

Josiah Meigs, somewhere about 1789 or 1790, went to St. George's, Bermuda, to practice as a proctor in the courts of admiralty. It was there that Charles Delucena was born. Charles' father soon became tired of his work in Bermuda, returned to this country and settled in New Haven, where he was soon after elected professor of mathematics and natural philosophy at Yale College. It was there that Charles D. passed his early childhood, from the second to the eighth year. In the ninth year of his life the family moved to Georgia, and it was there that Charles D. attended the university from which he received the degree of A.B. in 1809. In the same year he commenced the study of medicine under Dr. Thomas Hanson Marshall Fendell of Augusta, to whom he was apprenticed for three years. At the expiration of this time he returned, in 1812, to his home.

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* The biographic data presented here was obtained from the report of the Pennsylvania Hospital for the year 1897; from the Transactions of the Philadelphia College of Physicians, containing memoirs of the Meigs, and from various members of the Meigs family. I hereby take the opportunity to express my gratitude to Dr. Edward B. Meigs, Mr. Wm. M. Meigs, Mr. Arthur I. Meigs, Mr. Daniel D. Test, Superintendent of the Pennsylvania Hospital, and to Dr. Francis R. Packard, for the many kindnesses they showed me in furnishing the desired information and photographs.

He removed to Philadelphia and matriculated at the University of Pennsylvania in 1812, and received the degree of Doctor of Medicine in 1817. In 1815 he commenced the practice of his profession in Georgia.

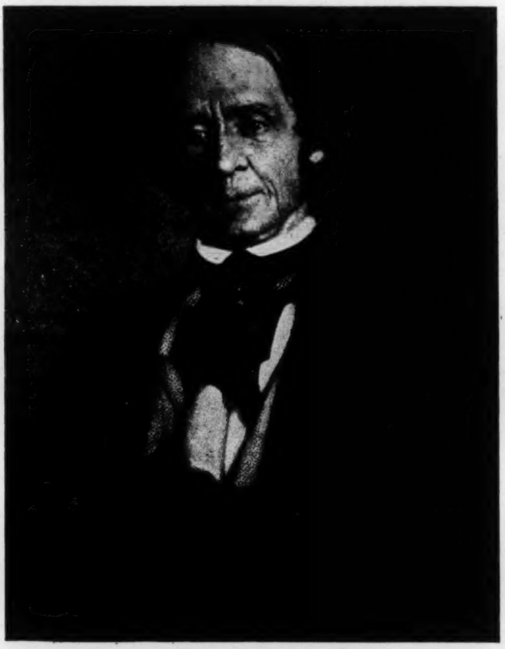

FIG. 1. CHARLES D. MEIGS.

He came to Philadelphia in the summer of 1817, and soon became prominent in his profession. In 1818 he received the honorary degree of M.D. from Princeton College, New Jersey; in 1830 he commenced, and continued for six years, to lecture on midwifery in the School of Medicine; in 1841 he was elected Professor of Obstetrics and Diseases of Children in the Jefferson Medical College, a position he held from 1841 to 1861; he also delivered various public lectures and addresses.[8] He was elected to the Lying-in Department of the Pennsylvania Hospital in 1838; he resigned this position in 1849.

He was connected with a large number of medical organizations. He was also a member of the Academy of Natural Sciences, and of the American Philosophical Society.

On February 25, 1861, he delivered his last lecture at the Jefferson Medical College, and retired from further active duties of his profession. He died June 22, 1869, aged seventy-seven years.

Charles Meig's literary works were very numerous. He was one of the original editors in 1826 of the "North American Medical and Surgical Journal"; he translated and published Velpeau's "Elementary Treatise on Midwifery"[10]; he also translated Colombat de L'Isere's "Treatise on the Diseases and Special Hygiene of Females" (1845). He is author of "Females and Their Diseases" (1848) which passed through several editions under the title "Woman, Her Diseases and Remedies"[15] (1851, 1854 and 1859). "Obstetrics; the Science and the Art"[12] (1849) which passed through four editions; "Observations on Certain Diseases of Children"[13] (1850); "Memoir of Dr. Samuel G. Morton" (1851); "Memoir of Dr. Daniel Drake" (1853); "Treatise on Acute and Chronic Diseases of the Neck of the Uterus"[14] (1854).

HIS CONTRIBUTION TO PEDIATRICS

From a pediatric standpoint, his book "Observations on Certain Diseases of Young Children"[13] is noteworthy. This book embodies material on diseases of childhood that he presented to his students in 1849. There are, of course, some opinions in the book that have not stood the test of time. He naturally did not know of the treatment nor of the etiology of diphtheria, nor did he know of the etiology of tuberculosis. However, the book as a whole abounds with observations that would do credit to a modern treatise on pediatrics.

It is interesting to quote one of the meaningful paragraphs of the first chapter:

> It is supposed, by the public, that the physician cannot understand the diseases of children because children cannot speak or explain their sensations. But, a knowledge of the diseases of children is not more difficult to obtain, than that of the maladies of adult persons, because in either case, the medical man relies on his own observations, and not upon statements he receives. The opinions of a patient in regard to his own case, as to the diagnosis, or as to the therapy, are, for the most part, utterly indifferent in the mind of the physician; he does not ask a patient's opinion in the diagnosis of a phthisis, of a hydrothorax, of an endocarditis, of a pleuritis, of a typhoid fever, of an exantheme, of a neuropathy, etc. When he seeks to find out their nature and seat, he interrogates the organs; he knocks at the door of the functions, and they admit him to see for himself; he inquires of them, and they have voices to answer him; for there is a language of the organs, and the functions speak with tongues, and the speech is plain, direct, vernacular, true, for it is the voice of nature that speaks, and nature cannot lie. But, the speech of man is a human invention, full of imperfections, full of double meanings, often directed by a false heart, or a misapprehending reason;—men say there is pain, when there is no pain; or they say they are sick here, when, in fact, they are sick elsewhere. They know not where they are sick, nor how; it is the physician's affair to find it out (ref. 13, p. 18).

All through the book are scattered paragraphs distinguished for their contents and style, for instance: "I would rather ask questions as to its health, of a baby a month old, than of its mother" (ref. 13, p. 22).

> Nothing lives, save in the presence of oxygen. It is even true that the spiritual soul being present, all life is a result of a process of oxygenation. Hydrogen, azote, chlorine, nor carbonic acid cannot evolve nor sustain life. Oxygen is the vitalizing, not the vital principle. It is the cosmic reagent for producing vitality out of nervous mass (ref. 13, p. 105).
>
> Descriptions the most accurate and elaborate abound in the medical library, and I should not now take the trouble to write with the sole and superfluous view of painting the visible and cognoscible phenomena of diseases familiarly known. It is better not to write, than to write merely in repetition of what authors, better qualified, have already done in this line (ref. 15, p. 121).

The most valuable portions of the book are those dealing with the treatment of brain apoplexy, umbilical granuloma, cyanosis neonatorum, and bowel complaints.

Charles D. Meigs believed that by placing a newborn child on his right side, the head and trunk being inclined upwards about twenty or thirty degrees, cyanosis will disappear. He quotes many cases to substantiate his contention. It is doubtful whether his observations on cyanosis can stand the test of time. Cyanosis is often due to cerebral hemorrhage, in which case, placing the child on the right side would be of no avail. Nevertheless, the chapter on cyanosis is worth reading by everyone interested in medical literature. It is full of interesting observations.

In the chapter on bowel complaints, Meigs quotes Simon's figures on the chemical composition of cows' milk and human milk and he comes to the conclusion that it is the larger quantity of casein in cows' milk that accounts for the frequent occurrence of indigestion in infants fed artificially. Although the trend of pediatric opinion at present is opposed to the idea that protein is responsible for intestinal disturbance in infants, the casein disturbance idea was a great advance in those days as it was one of the first attempts to make a scientific inquiry into alimentary disturbances of infants.

Charles D. Meigs' book, "Obstetrics; the Science and the Art"[12] the first edition of which was published in 1849, and the fifth in 1867, also contains a chapter on "The History and Diseases of the Young Child." The chapter discusses a number of subjects and deals extensively with cyanosis neonatorum. This book was dedicated "To the eminent Western physician, philosopher and scholar, Daniel Drake of Cincinnati."

General Medical Views

An insight into the human side of Charles D. Meigs can be obtained by reading the small pamphlet entitled, "Lecture, Introductory to His Course of Lectures for 1843-1844,"[9] published in 1843. This pamphlet, which was published by special request of a committee of Meigs' students contains views on medicine, religion, and philosophy. It is a defense against the accusation made against physicians about the uncertainty of their profession. It embodies a discussion of quacks. It also describes the methods the author employed in dealings with his patients. On reading this pamphlet one sees the author as a man of sincerity, as a scientist, philosopher, and as a religious thinker. His discourses on the manner of talking to patients reminds one of the religious prayers of the physicians of the Middle Ages. The pamphlet also reveals a thorough knowledge of general literature and history, a fulness of knowledge characteristic of many of the physicians of old.

In conclusion it is interesting to quote a few paragraphs by Arthur V. Meigs about his grandfather which give a bird's-eye view of the life of Charles D. Meigs:

> My grandfather's life was full of excitement and bustle, stirring incident and romantic event. Born on the beautiful and semitropical Island of Bermuda, and passing his boyhood in Georgia, a place then upon the confines of civilization, he imbibed many romantic ideas, and the untrammeled life he led strengthened his naturally robust constitution. When less than twenty-one years of age, he came to Philadelphia, having borrowed money to study medicine at its famous medical school. Here he made an early marriage, and, after living south only a year or two, returned to fight his way to success, surmounting all obstacles, although entirely unaided by any influence, relying alone upon his own strong will, and natural capabilities and assiduity. He did attain the highest possible success then to be reached in his profession. A man of influence in the city, a popular and highly esteemed teacher in one of the most famous medical schools of the day, his name was in everyman's mouth, and he lived an active life, finally to retire, full of years and honors, to a place in the country that he dearly loved, to enjoy there, in the society of his wife, the rest for which he had so long and so arduously labored.

II

John Forsyth Meigs

John Forsyth Meigs (Fig. 2), the son of Charles Delucena Meigs, was born in Philadelphia, October 3, 1818, being the third of ten children. At the age of sixteen he began the study of medicine and, after four years' attendance at the University of Pennsylvania, he received the degree of Doctor of Medicine, in 1838, when not yet twenty years of age.

He was at once elected a resident physician of the Pennsylvania Hospital, and served for a period of two years. After completing his hospital term, in April 1840, he sailed for Europe, visiting Italy, Switzerland, France, England, and Belgium, going east as far as Warsaw and Vienna, and south to Naples. While in Paris, he attended the lectures of Velpeau, Louis, and other eminent French physicians.

In August 1841, he returned to Philadelphia and commenced the practice of his profession. In the spring of 1843 he gave a course of lectures on Obstetrics in the Philadelphia Association for Medical Instruction. Subsequently he lectured upon other topics during the time he was connected with this organization.

In 1848, he published his book "Diseases of Children,"[18] which passed through three editions. In 1869, he associated with himself Dr. William Pepper for the fourth edition, changing the title to "Meigs and Pepper on Diseases of Children."[19] He was elected to the Medical Staff of the Pennsylvania Hospital in 1859, from which he resigned in 1881. He died December 16, 1882, at the age of sixty-four years.

Pediatric Views

If one compares the first edition of Meigs' Pediatrics published in 1848, with the sixth edition which appeared in 1877, or with the last edition of 1882, one is impressed with the progress made in the field of pediatrics, expressed by the changing views of the author. The most marked change is noted in Meigs' views on gastrointestinal lesions. While in the first edition Meigs bases all intestinal disturbances on an anatomic basis, he expresses the opinion in the later editions, that, in diarrheal diseases there are apparently no anatomic changes, a view held by the present day leaders of pediatrics.

It is interesting to read Osler's comment, in "The Alabama Student,"[23] on the difference between the first and later editions of Meigs' books, Osler seemingly ascribes the advance to Pepper instead of to Meigs: "If you compare Meigs and Pepper of 1870 with the third edition, or with the contemporary books on the same subject, you will see what a radical work it was for that date. To one section of the edition we may turn with special interest, namely, to diseases of the caecum and appendix. Nowhere in the literature, I believe, before 1870, is the importance of the appendix so fully recognized, or is there so good a description of the results of perforation" (ref. 23, p. 215).

An interesting and important essay by John Forsyth Meigs is one entitled "Observations upon the Sanitary Care and Treatment of Children and Their Diseases"[22] which was prepared at the request of the trustees of the Sanitarium for Sick Children. Meigs took up the question in detail, discussing every phase of the subject, such as the establishment of a sanitarium for sick children, accommodations for child and mother, regulations for the admittance of patients, type of bottles and nipples, prevention of infant mortality, and methods of artificial feeding or as he terms it, "hand feeding."

One can best gain an idea of the author's opinions of these matters by quoting directly from him. The following excerpts express John Forsyth Meigs' mature judgments on the question of infant feeding:

> In seeking to determine how we are to feed children who have been deprived of the breast, I can conceive of no method so likely to lead to correct results as the very simple one of taking nature for our guide. By ascertaining the quantity of milk a healthy nursing woman furnished at different periods of lactation, we determine the amount of liquid food we must administer to the hand-fed child, always bearing in mind that the food we choose shall resemble the natural aliment as nearly as possible. By careful comparison of the proportions of the constituents of cow's milk with those of woman's milk, we are enabled to bring the former, by the addition of water, sugar, and sometimes of cream, to a physical constitution much more like the latter than it is in its natural state (ref. 22, p. 227).

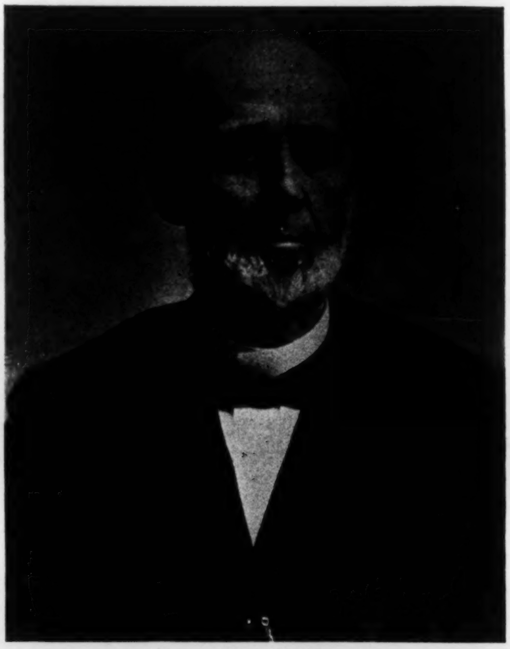

FIG. 2. JOHN F. MEIGS.

And again Meigs states:

> In a large institution, such as the sanitarium is probably destined to be, the more simply the food can be prepared, the better for all concerned. I advise therefore, that, as a general rule, the milk should be used diluted with simple water in the proper proportions. Milk containing fifteen per cent of cream is the

> kind I prefer, when it can be had; but as eight and ten per cent of cream are to be considered a fair average, I assume in the rules I mention that the cream is ten per cent.
>
> If the child be young, one to three months old or younger, I advise the addition at first, until the degree of digestive force of the particular child may have been determined by observations, of two parts of water. To each pint of this mixture should be added half an ounce of sugar of milk, or half the quantity (two drachms) of cane sugar. After it has been ascertained that food of this strength is well borne, the patient may be put upon the proportion generally to be employed at the age of the child, whatever that may be.
>
> From birth to the end of the first month, and often in the second month, the proportion of two parts of water to one of milk is the one I deem the safest and best. In the second month, and up to five or six months, the proportion ought to be half and half in healthy children. After this period it may be made two parts milk and one water until the end of the first year.
>
> In children in the second year of life the milk may often be given pure, though even at this age I have met with many cases in which the permanent addition of a fourth or a third of water renders the food more digestible and productive of better results. So long as the child thrives well on diluted milk, there can be no valid objection especially during the hot season, to a continuance of its use. It is certainly true that nature does not increase materially the richness of the breast milk in the second year of nursing (ref. 22, p. 225).

It is interesting to note John Forsyth Meigs' ideas on feeding intervals, a question on which there is no agreement among pediatricians to this day, some of them believing a four hour interval to be the best and others advocating a three hour interval:

> It is important also to establish some general rules as to the number of feedings per day. In very early life, the first and second months, food should be given every two hours, so much at each feeding as to make the pint, pint and a half, or quart per day required at the different ages. From the third to the sixth month, the feedings may be repeated every three hours. If this is done from six or seven A.M. to eight or nine P.M., there would be six feedings in the day. From six to eight ounces should be given at the time, according to the vigor and natural appetite of the subject, making in all from thirty-six to forty-eight ounces or from a little over a quart to three pints. After eight months most hearty children will take the eight ounces and some even more, or they may require now and then an extra meal, making up the total to nearly two quarts.
>
> I believe it is unnecessary, as a rule, to feed children in good health in the night after the age of eight months. If the last meal be given at nine or ten P.M., the child may usually go to six A.M. of the following day. Should it be uneasy in the night, a drink of plain or sweetened water ought to suffice (ref. 22, p. 226).

In the light of our present knowledge a two hour feeding interval is too short even for the first and second months of the baby's life. The present-day trend in pediatrics is to limit the quantity of milk for an infant to one quart. The ideas of Meigs in this respect, reflect the practice of the physicians at his time. In fact, we all remember that until a few years ago even pediatricians advised two hour intervals for the first and second month of the infant's life.

The feeding of sick infants is still an unsettled problem in pediatrics. Meigs' opinion in this matter is therefore of historical interest.

> When the patient with cholera infantum is weaned, and on artificial food, it is necessary to dilute the milk largely (half or even three-fourths) for a day or two, and only two or three tablespoonfuls every two hours, and to allow cold water, or brandy and water between as directed above. In obstinate vomiting, the milk ought to be withheld for twenty-four hours, and the small doses, two or four tablespoons, of beef or chicken tea given instead, one in two or three hours. If this quantity is not retained, a single tablespoonful may be given every hour, or teaspoonfuls may be tried every fifteen minutes (ref. 22, p. 229).

The following sentences touch on the question as to whether or not the addition of cream to milk is advisable, a protracted question in pediatric literature:

> I am well aware of the fact that some writers of authority oppose the addition of cream to ordinary cow's milk, on the ground that any excess of cream is injurious rather than beneficial. The objection, however, seems to me to be based upon theoretical rather than upon practical reasons. I have employed the food referred to above, made of arrowroot water, gelatine, milk, and a small additional amount of cream, with sugar, for many years with much success, and I know that it has been used a good deal by others. Moreover, the second preparation mentioned above, consisting of milk, cream, lime-water, and arrowroot water, in equal proportions, in cases of acute summer diarrhoea, has answered admirably well in my hands in a good many cases.

GENERAL MEDICAL ACTIVITY

In addition to his pediatric writing, John Forsyth Meigs wrote the "Address on the Opening of the New Lecture and Operating Room of the Pennsylvania Hospital"; "Memoir of Charles D. Meigs"[20]; and "A History of the First Quarter of the Second Century of the Pennsylvania Hospital."[21] He wrote all these in spite of his enormous practice, making as high as twenty-six or twenty-seven visits a day to patients' homes.

In addition to his writings he lectured on Practice of Medicine, and on Diseases of Children, in the Philadelphia Association for Medical Instruction. He was a Fellow of the College of Physicians, Philadelphia; a member of the Academy of Natural Sciences, American Philosophical Society, Philadelphia County Medical Society, and numerous other organizations.

III

ARTHUR VINCENT MEIGS

Arthur Vincent Meigs (Fig. 3), the son of John F. Meigs, was born in Philadelphia on November 1, 1850, and died in January 1912. He entered the College department of the University of Pennsylvania in 1866, but his father was impatient to have him begin his medical course and "took him out of college" at the end of two years. He began his medical studies at the University of Pennsylvania immediately and finished in the spring of 1871, but did not get his degree until some months later, on account of the rule that degrees were not given to students under the age of twenty-one. He spent parts of the years 1871 and 1872 abroad, largely in studying medicine at Vienna; a part of his time there was devoted to the study of skin diseases under Hebra. From 1872 to 1874 he was a resident physician at the Pennsylvania Hospital, and immediately afterward began the practice of medicine, which he continued until his death in January 1912.

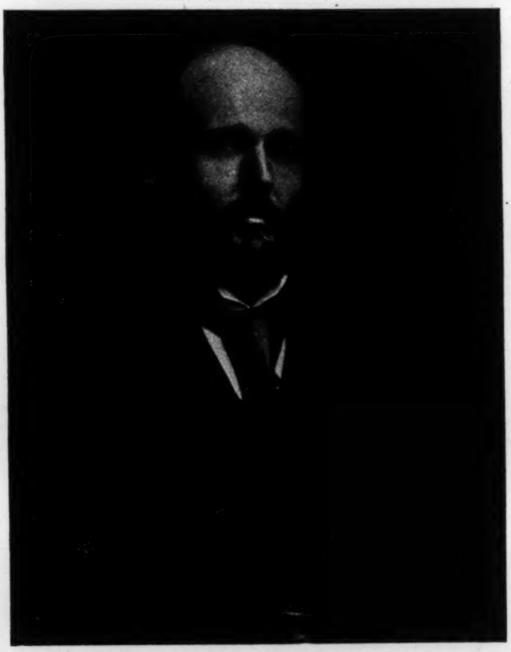

FIG. 3. ARTHUR VINCENT MEIGS.

He was attending physician at the Children's Hospital, at the Sheltering Arms, and at the Pennsylvania Hospital; at one time a Trustee of the University of Pennsylvania and of the Wistar Institute; an active member of the College of Physicians, and its president from 1904 to 1907. He was also at one time President of the Pathological Society; Consulting Physician at the Penitentiary, and at the Pennsylvania Institution for the Instruction of the Blind. In 1899 he was elected a member of the American Philosophical Society.

Pediatric Views

Arthur Meigs' pediatric achievement consists of his chemical analysis of human and cow's milk, which has served as a basis for modern infant feeding. His chemical work was published in his book "Milk Analysis and Infant Feeding"[5] which, although only 102 pages in length, may be considered a pediatric classic. In it are recounted the results of the chemical analysis made by the author of cow's and human milk, and a criticism of the work of other investigators. His analysis has established the fact that the amount of protein in human milk is very low, lower than the figures given by most chemists before him. Time has proven the analysis of Arthur V. Meigs to be correct, and at present most systems of infant feeding take into consideration the low casein content of human milk, although not everybody agrees with the original deductions of Arthur and John F. Meigs, drawn from the chemical analysis of milk. The description of the methods of analysis used by Arthur Meigs would do credit to any modern chemist. Most of the older chemists of that time determined the protein in milk indirectly by subtracting the amount of fat and lactose from the total solids. Meigs, however, determined the protein as well as all other substances in the milk directly on the basis of his analysis of human and cow's milk. Arthur Meigs formulated his ideas on infant feeding in the following paragraph:

Fig. 4. Facsimile of Signature.

> So far as bringing the other proximate constituents to like proportions with those in human milk, the first step must be to so dilute with water as to get the desired quantity of casein; the fat and sugar can be increased by the use of the necessary quantities of cream and commercial milk sugar. Taking the averages of cream and good city milk as already given, it will be found by calculation that if there be mixed together 10 c.c. of cream, 5 c.c. of milk, 10 c.c. of lime-water, and 15 c.c. of water, with 2.2 grams of milk-sugar, the desired mixture is had (ref. 5, p. 74).

In the following paragraphs Arthur Vincent Meigs expresses his views on the use of lime-water:

> That the use of lime-water (alkali) in an infant food makes a difference in its behavior with some reagents is shown by the following experiments: A food was made in proportions which will presently be given, and 10 c.c. of it agitated with ether and alcohol, as directed in Chapter 1, for the extraction of the fat; it was found that the coagulation took place in the form of a fine net-work, which remained permanently distributed through the lower stratum of the liquid, no sediment forming at the bottom. When an exactly similar mixture was made, except that the lime-water was replaced with water, leaving the fluid acid, and this agitated with ether and alcohol, thick heavy curds formed, which at once sank to the bottom. Again when two mixtures—one with and the other without lime-water—were treated with ten drops of acetic acid, the one without lime-water showed much larger heavier coagula than that which contained lime-water. These experiments show with certainty that the addition of lime-water does alter the coagulability of the casein when experimented with, whatever may

take place in the stomach; and Lehmann's opinion has been already quoted, that the acidity or alkalinity of milk makes a difference in the formation of the coagulum. Whatever may be the value of these artificial experiments, the great reason for the use of lime-water is that the experience of man has found it good, and that is sufficient reason for its use in the present state of knowledge. It is quite possible that in the future something better may be found, phosphate of lime, perhaps, for it is the salt which exists in milk in larger quantity than any other; but further and exhaustive study of the inorganic constituents of both human and cows' milk will be required to place this matter upon an exact scientific basis. It is very desirable that further study of the salts of milk should be prosecuted, and it is much to be hoped that in the near future exhaustive analyses will be made. The amount of inorganic matter in cows' milk is so much greater than that in human milk that, as there is at present no means of removing it without altering or destroying the other component parts, no infant food can be made exactly like human milk in respect to the amount of salts contained (ref. 5, pp. 72, 73, 74).

Arthur Meigs' prophecy came true. A good deal of research has been done of late years on the salt content of human and cows' milk, although the problem is far from settled. The acidity of cows' and human milk of which Arthur Meigs speaks, is now one of the liveliest topics for discussion in pediatric literature.

GENERAL MEDICAL VIEWS

In addition to his book "Milk Analysis" Arthur V. Meigs wrote "The Origin of Disease"[6] published in 1897; and "A Study of the Human Blood Vessels in Health and Disease"[7] published in 1907. The latter volume is a supplement to the "Origin of Disease."

The book "Origin of Disease" deals mainly with pathology as applied to clinical medicine. The author divides diseases into two main classes, extrinsic and intrinsic. The author, of course, knew nothing of bacteriology, the book having been written before the bacteriological period; he therefore speaks of extrinsic causes the nature of which is unknown. To quote him:

> For practical purposes of discussion, all diseases may be divided into two classes, those of extrinsic and those of intrinsic origin. Types of the former are small-pox and measles, which are caused by poisons that pass from one body to another. The contagious entity to which such diseases are due is as much a thing apart from human organism as a bullet which kills a man shot through the brain. The fact that the real nature of such poisons is absolutely unknown, whether they are solid, gaseous, or of some composition as yet beyond our understanding does not lessen the certainty that the cause is extrinsic. As a type of disease of intrinsic origin may be mentioned the formation of cysts in the kidney, which is so common a process in the aged and in those suffering with contracted kidney. It is the result of abnormal action on the part of the organism and is entirely independent of the direct action of any extraneous cause (ref. 6, p. 2).

The book was carefully prepared and the author did most of the histological work himself.

In spite of his advanced views in pediatrics he refused to accept the discoveries of Koch and others in bacteriology. This lamentable fact of great men refusing to accept discoveries of others has repeated itself many times in medical history.

An interesting side light is the discourse of Arthur Meigs on the question of how much credit a single individual should assume for investigative work:

> All these facts show that the tendency has been constantly toward the truth, and that physicians have been learning empirically for what reasons cows' milk has failed as an infant food, and how the difficulties which its use entailed were to be overcome.
>
> Investigators have thus, year by year and step by step, been approaching the desired goal, and it needed but a touch for light to be let in upon the whole subject. Many hours and much careful and patient labor have been expended upon investigations in this field, and no single worker could have done his part without having

before him the results of the labors of his predecessors to guide him a long way in the field, and give him easily the knowledge which would enable him, after much toil and trouble, to advance one little step more toward what was previously unknown. Thus, no individual investigator, no matter how important the advance in knowledge he may have made, should assume too large a share of credit; for it can be but a very small part of the great whole, and would be valueless but for the rest, into which it fits, and completes that which would otherwise be useless (ref. 5, p. 71).

The names of all three Meigs, father, son, and grandson, should go down in history as pioneers of American pediatrics, as all three of them have made distinguished contributions to this important branch of medicine.

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ALEXANDER GARDEN, M.D., F.R.S. (1728–1791)

COLONIAL PHYSICIAN AND NATURALIST*

By PIERRE GAUTIER JENKINS, M.D.

CHARLESTON, S. C.

AMONG those places in our country where the seed of American life and progress was sown, there are few, if any, which offer a more delightful and fertile field of research for students of history, or for those of us who love the things of the past, than the coastal region of South Carolina, and particularly its metropolis, Charleston.

The history of the progress of modern medicine in this section of the country, which still retains much of its Old-World charm and culture, is most interesting in that those pioneer physicians who first settled here during the eighteenth century and for a period of years after, had, in a large measure, a share in moulding and guiding scientific thought, and promoting the highest scientific attainments in this country throughout many years and which undoubtedly has led to the present era of modern scientific medicine in America.

In his History of South Carolina, David Ramsay, M.D., says that,

> In the infancy of Carolina, when European physicians monopolized the practice of physic, there were more experiments made, more observations recorded, and more medical writings ushered into public view by the physicians of Charlestown,[1] than of any other part of the American continent.[2]

Of these pioneer physicians, in Carolina during the Colonial period, Dr. Alexander Garden was a leader in scientific thought and practice. McCrady says of him, after reciting the accomplishments of some of the most prominent physicians, namely: William Bull, Lionel Chalmers, John Lining and others, in the province of Carolina at this time, that, "the most famous physician of Colonial times was Dr. Alexander Garden."[3]

Alexander Garden was born in Scotland about the year 1728, his father being a prominent clergyman of the Parish of Birse, in the Shire of Aberdeen. His early education was received at the Marschal College of the University of Aberdeen. He studied medicine under the celebrated Dr. John Gregory at Edinburgh.

About the year 1752, Dr. Garden came to America and settled in Prince William's Parish, South Carolina, and here started the practice of Physic. He was associated with a Dr. Rose.

During the year 1754 his health began to fail and he sought a change of climate by going to New York City. While there he was offered a Chair on the Faculty of the recently organized King's College, now Columbia University, but he declined the offer. Upon regaining his health, Dr. Garden returned to South Carolina and settled at Charlestown where he practiced medicine continuously for the next thirty years.

Dr. Garden was a man of great culture and considerable learning. Dr. David Ramsay says of him:

> He was well acquainted with the Latin and Greek classics, understood the French and Italian languages, was a considerable proficient in the knowledge of the Belles Lettres; in Mathematics, Philosophy, History, and miscellaneous literature; but his attention, when the duties of his profession permitted any relaxation, was chiefly to the study of Natural History and

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* Read before The Medical History Club of Charlestown, South Carolina, March 4, 1927.

[1] Today Charlestown is called Charleston.

[2] Ramsay, D. History of South Carolina, ii, 110.

[3] *a.* McCrady, E. South Carolina under Royal Government, Charleston, S. C., 1719–1776.

b. Ramsay, D. History of South Carolina, ii, 112, 469.

particularly to that branch which is called Botany.

It was in the study of botany that he apparently found the greatest joy and pleasure, and wherein he became famous. In his correspondence with the English naturalist, John Ellis, Esquire, F.R.S., he often refers to the time when he hopes to retire from the practice of medicine and devote all of his time to botanical pursuits. Frequently we find him bemoaning the fact of his inability to devote more of his time during his busy days of practice to the collecting and the studying of specimens of the wonders of nature about him. In a letter to Mr. Ellis, who had censured him for his failure to answer his correspondence and collect certain specimens for him, Garden says:

> My dear Friend, I must here again repeat an apology to you for neglecting many things which you recommend to me. I can assure you that my inclination is great to serve you in every particular, and that not being able is a greater disappointment to me than it possibly can be to you; for I am sure that I must suffer more than you for any neglect of study and application on my side, but let me assure you that I am bound as if manibus pedibusque, by a servile kind of attendance on practice which from time immemorial has been introduced and continued here; and every deviation is construed into neglect. The most pitiful slave must be as regularly seen and attended as the Governor; this custom I am determined to get the better of by degrees, but nothing of that kind can be done in a hurry. From seven in the morning until nine at night I cannot call half an hour my own. Such is my laborious situation. I would not give you the trouble of perusing these bagatelles if it were not to apologize for neglecting some of your commands.

At another time stressing his busy life, and at the same time including a bit of satire, he says:

> In Charlestown we are a set of the busiest, most bustling, hurrying, animals imaginable, and yet we really do not do very much, but we must appear to be doing, and this kind of important hurry appears among all ranks unless among the gentlemen planters, who are absolutely above every occupation but eating, drinking, lolling, smoking and sleeping, which five modes of action constitute the essence of their life and existence.

In the year 1755, John Ellis, F.R.S., of England was responsible for commencing the correspondence between Garden and Linnaeus, the great Swedish botanist. Ellis describes Garden to Linnaeus, in recommending him as a correspondent, as "a man well worth your friendship, for he is very ingenious and a sensible observer of Nature." Linnaeus apparently was not disappointed, for soon afterwards their correspondence began, and continued over a period of many years.

In Garden's letters to Linnaeus we find constantly his presentation of new genera of plants with the most elaborate and accurate descriptions and drawings of them. He is always eager that Linnaeus should verify his descriptions and classifications of the plants which he finds in Carolina.

Dr. Garden's esteem of Linnaeus was akin to that of worship, and his commendations of Linnaeus' "Systema Natura" are numerous and full of praise. On the other hand, frequently in his letters both to Linnaeus and Ellis respectively, he expresses disgust and indignation at the inaccuracies contained in Catesby's "Natural History of Carolina," and shows himself as Sir James E. Smith says, "a thorough going Linnean."

In the twelfth edition of Linnaeus' "Systema Natura," Garden's name is subjoined to many, then new and little known species, of fish and reptiles. In the study of the latter, he at first was not enthusiastic, but as time went on he was stimulated by requests for specimens of rare animals of the new world from Linnaeus, and soon we find him making valuable contributions in the field of zoology. He wrote many accounts concerning his various zoological discoveries in Carolina, and among them the following were published in the Transactions of the Royal Society of London:

An account of an Amphibious bipes (the mud iguana or syren of South Carolina). Communicated in a letter to John Ellis, Esq., F.R.S., and read before the Royal Society.

An account of the Male and Female Cochineal Insects. In a letter to John Ellis, Esq., and read before the Royal Society, December 23rd, 1762.

An account of two new Tortoises, Communicated in a letter to Thomas Pennant, Esq., F.R.S., and read before the Royal Society, May 2nd, 1771.

An account of the Gymnotus Electricus, communicated in a letter to John Ellis, Esq., and read before the Royal Society, February 24th, 1778.

In the year 1768, Dr. Garden sent a specimen of the Syren or Mud Iguana to the British Museum at London.[4]

We learn through a letter from Ellis to Linnaeus dated at Gray's Inn, London, January thirty-first, 1766, that the writer speaks of "our famous anatomist Doctor Hunter," probably Dr. John Hunter, the celebrated English anatomist and surgeon, who in the same year that this letter was written had dissected a specimen of the Syren or Mud Iguana of South Carolina which had been received from Garden. Ellis relates that Hunter found that the Mud Iguana in its larval state was similar to the English Lacerta or Newt, and differed from it, in that the Mud Iguana had only two feet.[5]

Garden's ability as a botanist was highly appreciated by Linnaeus who sought his advice and opinion as to the proper classification of certain plants. As further evidence of his regard and affection for Garden, the great Linnaeus called that beautiful and fragrant shrub, the Cape Jasmine, which had been named by Ellis and introduced by Warner, the Gardenia. Of this fact, Ellis, on April eighth, 1761, writes to Garden:

> Linnaeus has actually adopted it among his new genera, which will be published in his Addenda, and the Royal Society, which still makes it more public here, and has ordered my account of it to be printed. I gave it in Linnaeus' characters with those of the Halesia, and it will surprise people when they know that a Nurseryman, James Gordon, in less than three years has made 500 pounds from four cuttings of the plant. Everybody is in love with it and you may depend on having a plant of it from me. As it is a double flower, beside being the native of a warm climate, it produces no seeds here.

To further extend his knowledge in Natural History, Dr. Garden accompanied Governor James Glen of South Carolina into the hill country of the Cherokee Indians, to whom the Governor went to make certain treaties. On this expedition Dr. Garden discovered many new plants and animals and accurately and scientifically recorded accounts of them together with drawings of many of them.

Dr. Garden was not only a keen observer and student in the sciences of medicine, botany, and zoology respectively, but we find that in the year 1759, he published "Garden's Meteorological Journal and Observations at Charlestown, S. C." In the same year he writes to Ellis and relates in the most technical terms, astronomically speaking, the location in the heavens of a comet, which he observed from April third, to April sixth, 1759.

Dr. Garden published in 1764, an account of the properties, and a botanical description of the Virginia Pink-Root or Spigelia Marilandica, an herb indigenous to this section. At this time he also introduced this herb as a drug into medical practice, that is as a vermifuge, for which purpose it was prescribed quite generally for more than one hundred years afterwards.

He described, in 1765, two new genera of plant life, the Stillingia and the Fothergillia, dedicated respectively to two Englishmen whom he greatly admired, namely, Benjamin Stillingfleet and Dr. John Fothergill. Some ten years before this he had contributed to the philosophical transactions of the Royal Society. He was also the first to describe the plant Halesia, the account of which is found in the Transactions of the Royal Society to which it was read, in 1760, by John Ellis.

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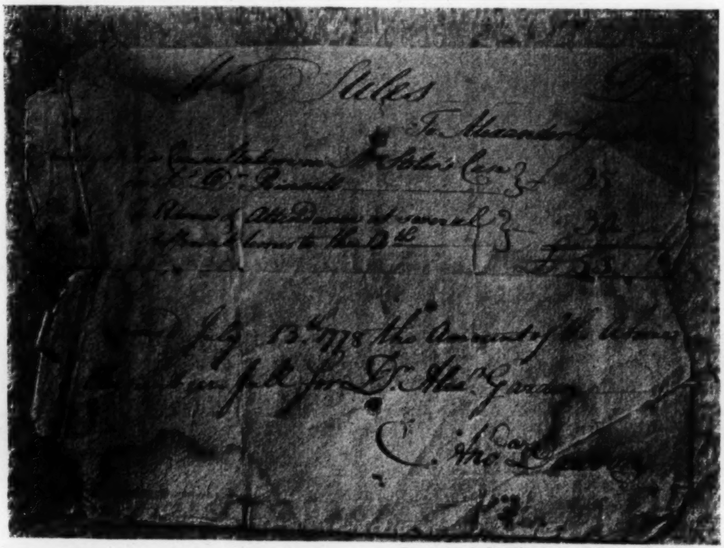
[4] Smith, Sir J. E. edited by, Linnean Correspondence, London, i, 565.

[5] Smith, Sir J. E. edited by, Linnean Correspondence, i, 186.

Garden was quite modest regarding his abilities as a botanist, and in the following words found in a letter to Ellis we find this verified; besides we find him deploring the fact of the paucity of popular interest in botany in Carolina, and of this he says:



Courtesy of the Charleston Library Society.

FIG. 1. A PHOTOGRAPHIC REPRODUCTION OF AN ORIGINAL RECEIPTED BILL OF DR. ALEXANDER GARDEN. RECEIPT DATED JULY 13TH, 1778. THIS SHOWS THAT DR. GARDEN HAD A CONSULTATION WITH DR. POINSETT; PROBABLY DR. ELISHA POINSETT, WHO PRACTICED MEDICINE IN CHARLESTON, S. C., AND WHO WAS THE FATHER OF JOEL R. POINSETT, ESQ., FOR WHOM THE BEAUTIFUL FLOWER, THE POINSETTIA, WAS NAMED.

> Ever since I have been in Carolina, I have never been able to set my eye upon one who has barely a regard for Botany. Indeed I had often wondered how there should be one place abounding with so many marks of the Divine wisdom and power and not one rational eye to contemplate them; or that there should be a country abounding with almost every sort of plant and almost every species of the animal kind and yet that it should not have pleased God to raise up one Botanist. Strange indeed that this creature should be rare.

He longed for companionship in this study, one with whom he could discuss and explain his discoveries; and we find that the visits of a noted botanist from Philadelphia, John Bartram, were sources of particular pleasure to him. As he writes to Ellis of one of Bartram's visits, "We cannot possibly spend any time together except after dinner and supper, about half an hour, but you may easily guess that this is a most agreeable hour."

Dr. Garden's professional calls, to distant points in the country about Charlestown, seem to have been sources of possibly greater wealth to his botanical and zoological account than probably any pecuniary returns for professional services rendered, for on these occasions we find him as he is travelling on his way, ever looking out for some new plant or animal. It is possible that on one of these trips he discovered the Pink-Root, or the vermifuge previously mentioned.

We are glad to note here that Dr. Garden's despair of popular interest in botany in South Carolina during the first few years of his residence here must have been changed to delight and pride as he later saw the work of William Bartram, son of John Bartram, Thomas Walter, John Drayton (1766–1822), John L. E. W. Shecut, James MacBride, and Stephen Elliot. Furthermore, Dr. Garden's enthusiastic and inspiring leadership as a naturalist was undoubtedly the guiding spirit in the accomplishments of those later and notable South Carolina botanists, namely: Henry W. Ravenel, Louis R. Gibbes, Francis Peyre Porcher and others.

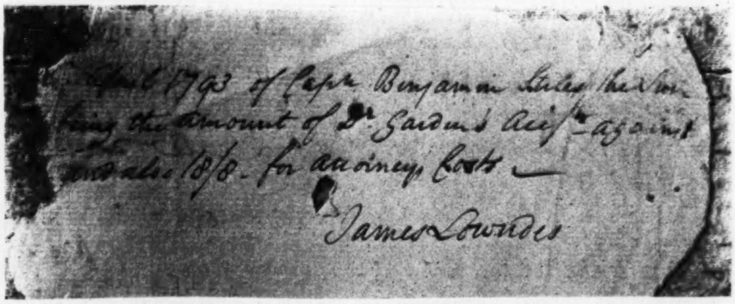
Dr. Garden's leadership, in things scientific in the community, surely must have acted as a stimulus to those officers and members of the Charlestown Library Society who on January twelfth, 1773, recorded in this Society's interesting old minute book the following:

> His honour the President proposed that a special committee should be appointed for collecting materials for promoting a Natural History of this Province, which was agreed to, and the following gentlemen were appointed thereon, viz., Messrs. Baron, Chalmers, Colcock, Cosslett, Fayssoux, Grimball, F. K. Gordon, Hewat, Heyward, D. Deas, Arthur Middleton, Milligan, Murray, Moultrie, C. C. Pinckney, Rhind, Shirley, Savage, Simpson, Smith, and Wells.

Of the above named Committee, the following were prominent physicians in the Province, namely: Baron, Moultrie, Chalmers, and Fayssoux.[6]

This action on the part of the Charlestown Library Society and the subsequent accomplishments of their Committee for the promotion of a Natural History of the Province, inaugurated that which proved to be the starting point of the Museum idea in America, and marked the date of the founding of the Charleston Museum, which is today the oldest Museum in North America.

There is no mention made of Dr. Garden's name as one of those actively taking part in this organization, but we know from reading his correspondence with Ellis and others that many of the men on the Committee and especially two of this Museum's first curators, namely Charles Cotesworth Pinckney and Dr. Alexander Baron were his most intimate friends, and no doubt because of his large practice and already extensive interests, Dr. Garden privately advised and encouraged these men in their notable undertaking rather than officially taking part in these activities.


[illegible] 1793 of Capt Benjamin Stiles the Sum
being the amount of Dr Garden's Accts against
[illegible] also 18/8 - for attorneys Costs —
James Lowndes

Courtesy of the Charleston Library Society.

FIG. 2. A PHOTOGRAPHIC REPRODUCTION OF AN ORIGINAL DOCUMENT BEARING DR. GARDEN'S NAME. THIS WAS WRITTEN APPARENTLY IN THE YEAR 1793, TWO YEARS AFTER DR. GARDEN'S DEATH. EVIDENTLY THE ACCOUNT REFERRED TO HEREIN IS IN CONNECTION WITH THE SETTLEMENT OF HIS ESTATE.

After some hesitation on his part, because of what he intimates was a sense of unworthiness of the honor, he allowed his friend Ellis to present his name for membership in the Royal Society at London, and in the year 1773 was chosen a member of that distinguished body.[7] Some of his various contributions to the Society's Transactions have been mentioned. After his return to England in later years, Dr. Garden was appointed one of the Council of the Royal Society, and afterwards was one of its vice-presidents.

Dr. Garden's unusual accomplishments in other fields of science apparently did not act as an impediment to his close attention as well as the application of his investigative mind to the study of disease. Rather we may consider his researches in natural history, the normal outgrowth of a highly scientific, cultured mind.

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[6] "Minutes of Charlestown Library Society, A.D. Jan. 12th, 1773. Charlestown, S. C."

[7] Smith, Sir J. E. edited by, Linnean Correspondence, i, 593.

His grasp of the nature of disease and the application of the investigative and experimentative methods in accomplishing its eradication is well illustrated in his description of the great epidemic of smallpox which was prevalent in Charlestown in the year 1760, soon after the great war with the Cherokee Indians.

In writing to Ellis of his part in this great struggle against an enemy more deadly than the poisoned arrows of the Indian savages in the recent war, he relates how that in twelve days more than two thousand eight hundred persons were inoculated with the smallpox, and further says:

> At one time the lives of five hundred persons lay very heavy on my mind, and the necessary attendance that their cases required was more than my strength was equal to. But that scene is beginning to wear over and I have just stolen a moment to give you a scrap. Ever since the beginning of February last the smallpox has raged here with great fury and with great mortality, especially in the natural way. The inoculated patients, of whom there have been a very great number, did not come so well off as might have been expected at first, but of late I have discovered a method of treating them, partly owing to some hints given me by our learned friend, Dr. Adam Thompson, of New York, and partly by some bold trials on a negro of my own, which scarce ever failed of breaking the force of the disorder and its malignity, so far as uniformly to produce a mild pock, either by inoculation, or by the natural infection; but of this more afterwards. I am now much engaged in making further trials so as to put this matter beyond all doubt, viz., that there is a real corrector of this disorder, by which it may be rendered so mild as that one life in a thousand shall not be endangered; this I hope to be able to make fully appear from both reason and practice. You may readily judge that I have good grounds to affirm this, or otherwise I should be far from writing so positively to you in a matter of this consequence.

Again we read of Dr. Garden's work on smallpox in a letter he wrote to Linnaeus, and dated at Charlestown, South Carolina, June second, 1763, wherein he says:

> Ever since the present year began I have been exceedingly hurried by a very epidemic smallpox which has raged here amongst us, and besides the vast numbers which I have attended in the natural way, I have inoculated several hundreds . . . Some years ago, Dr. Adam Thompson began, the first in America, to use with great success, Boerhaave's proposed specific of mercury and antimony, and since that time the practice has extended all over the continent. I have differed a little from him; since I used it, I have inoculated about eight hundred whites and blacks, out of which number I have only lost one white child and one negro boy. I intend soon, when the hurry is over, to publish an account of the method for the benefit of mankind, and to subjoin any remarkable observations that occurred to me. I think it will from thence appear that the variolous disease is not a disease of the blood originally, and that the fever is ex se a simple intermittent. You need not doubt but I shall immediately order a copy to be sent to you as soon as ever it is published.[8]

Unfortunately, it has been impossible thus far to trace the final results, if there were any, to this potentially valuable experiment which Garden carried out at this time. We find no mention of it in any of his later published correspondence with Ellis or Linneaus. All efforts towards finding a published account of Dr. Garden's work on smallpox have failed thus far. It would be an interesting speculation as to what his idea of "a real corrector of this disorder" was. It was fifteen years after Garden had written to Linnaeus and Ellis concerning his work on smallpox that Edward Jenner, in England, first started a careful investigation of the subject of smallpox vaccination, and whose discovery of its efficacy was not completed until 1796. Jenner's first published account of this work, entitled, "An Inquiry into the Causes and Effects of the Variolae Vaccinnae" did not appear until 1798, just seven years after Dr. Garden's death.[9] Whether there was any connection between the work of these two men in their endeavor to rid mankind of a dreaded scourge, we are not prepared to say, but one thing they had in common, and that was, a sincere and earnest quest for scientific truth.

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[8] Smith, Sir J. E. edited by, Linnean Correspondence, i, 316.

In this connection it is interesting to note the following inquiry made by Garden of Ellis, concerning the welfare of the Royal Society at London. He asks, "Pray, how does your Royal Society prosper, have you many men at present who have the eager and ardent desire of investigation among them, or who are animated with the love of inquiry?"

Dr. Garden in time became known to many men of science the world over, and he corresponded extensively with many of them, among whom besides those already mentioned, were Peter Collinson, John Bartram, Gronovius, Lavater, Colden, Solander and Benjamin Rush.

Dr. Garden, being a citizen of much influence in the community, naturally extended his interests beyond scientific pursuits, and we find that he was intensely interested in the economic welfare of this section. He endeavored to exploit the natural resources of the country about him. On his adventurous expedition to the Cherokee country with Governor Glen in 1752, Ramsay says,

> He discovered an earth which upon trial by the manufacturers at Worcester in Great Britain, was deemed equal to the finest porcelain that was ever imported from India. Unfortunately, no precise knowledge can now be had of the spot where this valuable earth was found. Hitherto no advantage has resulted from its discovery, and no doubt exists of its reality and importance.

In many of his letters to Ellis, Dr. Garden speaks of his earnest desire to see established in Carolina a system of Provincial Gardens which seem to have corresponded somewhat to our modern government agricultural experimental stations. In this way he hoped to interest the planters in cultivating various vegetable herbs from which certain dyes might be derived and which could be substituted for that obtained from the indigo plant which he predicted in time would become an unprofitable product, because of its gradually increasing overproduction and comparatively expensive production.

He also tried to induce the planters to grow hemp, several bushels of seed which he bought in New York and had shipped to Charlestown, where he distributed it amongst several Carolina planters who he says, "let it die and rot by them after it arrived, without ever choosing to give themselves the least further trouble about it." Here we see at this early period an advocate of the diversification of crops.

Regarding the proposed Provincial Gardens, he wrote to Ellis on May fifteenth, 1773, as follows:

> As to Provincial Gardens in general, I think they would be extremely useful if applied chiefly to the purposes of agriculture and commerce; kept on a large scale, and on a public bottom; but as to a botanic garden, I am afraid it will not as yet answer in any part of America, much less in these new and almost uninhabited provinces, where the expence would be great and the advantages small . . . When the present heats, heart-burnings, and uneasinesses in America are over, and people give up the study of politics for the more sensible study of the cultivation of their lands, and natural police, then I am persuaded the idea of Provincial Gardens will be revived and carried into execution.[10]

It appears that his endeavors along these lines as has already been intimated, were more or less ignored by the planters, some of whom later saw the truth of his foresight.

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[9] Garrison, F. H. History of Medicine, 1921 Ed. 2, 374, 375.

[10] Smith, Sir J. E. edited by, Linnean Correspondence, i, 598.

In commenting on these almost futile efforts of his in behalf of the welfare of his people, he says philosophically,

> There seems to be a kind of necessity to drive the dull part of mortals to their own happiness and welfare. The task is irksome but the reflection of having intended and promoted a general good is the superior reward.

Among the few and brief biographical sketches extant of Dr. Garden, the statement is made in most of them that he accumulated a considerable fortune during the thirty years of his practice of medicine in Charlestown. It is interesting to find that in several of his letters to Ellis in the latter years of his residence in Carolina, he often expresses the fond hope of quietly returning to England, and is very desirous of learning whether it is possible to live respectably in London with his family of five, on five hundred pounds sterling a year. If he did amass a fortune he no doubt, from this inquiry, practiced the proverbial Scotch thrift.

We find recorded in this connection in the *South Carolina Gazette*, Charlestown, S. C., in its weekly edition bearing the dates, "from Thursday, May 29th, to Thursday, June 5th, 1755," under advertisements, the following notice,

> On Monday, the 2nd., instant, met at Mr. Gordon's, the Faculty Of Physic, (Doct. John Moultrie, President), for the better support of the Dignity, the Privileges and Emoluments of their humane Art, especially those allowed them by the King's Authority, national custom, and the usuages of all Places and Provinces, Charlestown only excepted, they, considering that they are called out under the greatest inclemencies of weather, sometimes merely to gratify the patient, sometimes when no medicines are required, or only such as the families themselves are provided with, and likewise that they are often slowly and seldom sufficiently paid for their solicitous care in providing the greatest of all temporal blessings, nay that without which life would be misery, viz., the health of their fellow citizens; neither can they think that the payment of an apothecary's bill is sufficient reward for him who acts in three distinctive offices of Physic, Surgery, and Pharmacy, they therefore, have unanimously resolved that after the tenth instant, they will give no further attendance without a reasonable fee paid at the first visit and at every other visit during the course of their attendance. Published by Order of the President. William Murray, Secretary.[11]

McCrady says that we are not informed whether the Faculty were able to carry on their practice on this cash basis. Dr. Garden's apparent ability to amass a fortune from his practice might have been an exhibition of the efficacy of this decree.

Unfortunately, we are left very little from the past regarding Dr. Garden's personal and domestic life. He was married at Charlestown on Christmas Eve, in 1755, to Elizabeth Perronneau. There were three children from this union, a son and two daughters. We learn of a brother, Francis Garden, who studied medicine in Scotland in 1767, and who arrived in Charlestown in 1769 when he was to relieve Dr. Alexander Garden of some of his arduous practice. While in the country about fifty miles from Charlestown this brother is said to have died "of a violent fever" in the year 1770.

Sir James E. Smith describes Garden as "a cheerful and benevolent character," and that his person and manners were peculiarly pleasing. Ramsay says of him, that, "he was fond of good company and particularly of refined female society, and to it he devoted a considerable portion of his time; but enough was reserved for mental development."

His broad charity is thus displayed in the following sentiment expressed after he had been informed that another botanist abroad had unwittingly plagiarized on some of his work, of this he says, "It is a matter of little moment who declares the glories of God, provided only they are not passed over in silence." Here let us also include one of his aphorisms expressed in a letter to Linnaeus, as follows, "Nature can certainly do much more without learning, than learning without Nature."[12]

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[11] *South Carolina Gazette*, Numb. 1093, From May 29th, to June 5th, 1755. Charlestown S. C. Newspaper Files of the Charlestown Library Society, Charlestown, S. C.

Dr. Garden spoke of Henry Laurens, Esquire, of Charlestown, as "my very particular friend," and upon the latter's visit to England in the year 1771 to place his son, John, in college he was introduced to John Ellis by Garden. In describing Laurens to Ellis in a letter dated at Charlestown, July thirteenth, 1771, Garden says;

> You will find him so intelligent on everything relating to America, I do not mean on politics, for that I know is not your concern; but on every subject where the interest of America either regarding commerce or colonization, is concerned, that I think you will take pleasure in his conversation. He is minutely acquainted with the state of this and neighboring provinces.[13]

Of Laurens' son, John, Garden said,

> I think he has genius, and I know he has application sufficient under good masters to enable him to become an accomplished man and make him a joy and delight to his father, as well as an ornament to his country.

Young Laurens appears to have been a talented draftsman, and executed several plates of some of Dr. Garden's most interesting specimens which were sent to Linnaeus and Ellis, respectively.

Dr. Garden's estimate and conception of Henry Laurens and his son, John, were well founded, for the former proved a few years later to be one of the outstanding leaders of the colonists in the struggle for American independence. In the year 1775 he was president of the Continental Congress and later was sent as an emissary of the colonists to the Netherlands, where he was to negotiate a commercial treaty with that government. It was during this voyage, that he was captured by the British.

Dr. Garden's appreciation of John Laurens, and his predictions of what a valuable citizen he would be to his country some day, were thoroughly realized as we read of his courageous conduct in battle under the American flag a few years after these prophecies of his greatness had been recorded. During the War for American Independence he was made an aide to General George Washington, and in the year 1778 he was especially cited for his bravery in action and recommended to higher rank by the Continental Congress.

Dr. Garden was intensely interested in the political affairs of the colony, although he plainly makes the statement to Ellis, "I am no politician." However, he was a keen observer of these things, but apparently never took any public part in politics. In his private correspondence he frequently writes of the blunders of the provincial government in its dealings with the Indians, and his language is strong in his condemnation of many of its policies.

At this point we learn of his firm adherence to the Crown upon the opening of the rebellion of the colonies against the domination of Great Britain. He declared himself as believing that some of the policies of the mother country, such as the so-called Stamp-Act, were rather unjust, but he felt that the Americans had lost their heads and had exaggerated matters a great deal.

Throughout the years when the Colonists fought for their independence, Dr. Garden maintained his loyalty to the Royal Government, and for this adherence his valuable properties in Carolina were confiscated.

At this time his only son espoused the cause of the Colonists and became noted for his bravery as a soldier. He was made Aide-de-Camp to General Greene, and in the year 1782 was a lieutenant in Lee's Legion. His son's active support of the rebellion against His Majesty's Government was a cause of profound disappointment and no little bitterness on the part of the Royalist father. In fact it is said that Dr. Garden was one of the first to send congratulations to the British General, Lord Cornwallis, upon his decisive victory at Camden in 1780.

His son published in the year 1822 two volumes, entitled, "Anecdotes of the Revolutionary War."

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[12] Smith, Sir J. E. edited by, Linnean Correspondence, i, 293.

[13] Smith, Sir J. E. edited by, Linnean Correspondence, i, 589, 590.

Dr. Garden evidently was never of a robust constitution. Dr. Ramsay says that on his arrival in this country he brought with him "an hemoptoic constitution," but that the complaint was suspended during his residence in Carolina. However, we find frequent references in his letters to his more or less constant state of ill health, in spite of his extensive and intensive activities. He refers to frequent attacks of "nephritic pain" and "bilious fever." It is supposed by some that he suffered from tuberculous disease to which he finally succumbed.

He returned to England in rather broken health in the year 1783. His confiscated properties in America were later returned to him. Upon his return to Europe he was warmly received by the men of science there, many of whom he had corresponded with for many years. Hoping that it would improve his state of health he now traveled a great deal and wherever he went, among the scientists of several countries, his fame had preceded him. Ramsay says, "He was received as a man who had done honor to his native land and extended its reputation as the soil of genius." His health entirely gone he finally settled in London and died there in the year 1791.

In conclusion let us catch a glimpse of Dr. Garden's warmth of spirit, and his conception of immortality which he expressed in a letter to his old and devoted friend John Ellis:

> Remember me in particular to Dr. Solander, how happy should I be in having an hour or two's tête-a-tête with you both. If seas and mountains can keep us asunder here, yet surely the Father of Wisdom and Science will take away that veil, and these obstacles, when this curtain of mortality drops; and probably I may find myself on the skirts of a meadow, where Linnaeus is explaining the wonders of a new world to legions of white candid spirits, glorifying their Maker for the amazing enlargement of their mental faculties. What think you of this time, my dear friend? Shall we have a hearty shake of the hand, if such practices be in the mode? Believe me, I long to see more of my God, and to know many of my friends that I am afraid I cannot meet elsewhere.[14]

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SHAKESPEARE AS A NEUROPSYCHIATRIST

By GEORGE E. PRICE, M.D.

SPOKANE, WASH.

AN admirer of the genius of Shakespeare and a lover of his writing, a physician with a neuropsychiatric trend, has noted from time to time such passages as seemed to bear on his chosen specialty.

Little by little, note was added to note and the interest in the search increased, also the writer's admiration of the power of observation displayed by the man who "wrote for all time," especially as to the accuracy of what may be termed the "clinical descriptions" of certain neuropsychiatric deviations in the characters depicted.

If occasionally a quotation, because of its aptness and applicability, is given a meaning other than that which the poet may have intended, I trust that my readers, after exclaiming with Morocco:

> Oh hell! what have we here?

will be lenient and accept as my apology, that the application is,

> an ill-favored thing, . . . but my own.

HEREDITY

The influence of heredity is a subject which belongs to the broader field of medicine, rather than to neuropsychiatry alone, but let us consider a few quotations which indicate Shakespeare's knowledge of the laws of inheritance, both as to physical and mental traits. In the matter of direct inheritance, the words of Belarius, in 'Cymbeline," are very much to the point.

> Cowards father cowards and base things sire base.

In the first part of King Henry the Sixth, Suffolk makes the following contribution:

> For Henry, son unto a conqueror,
> Is likely to beget more conquerors,
> If with a lady of so high resolve
> As is fair Margaret he be link'd in love.

Another reference to the inheritance of traits of character is found in "Anthony and Cleopatra":

> *Lepidus.* I must not think there are
> Evils enow to darken all his goodness;
> His faults, in him, seem as the spots of heaven
> More fiery by night's blackness; hereditary
> Rather than purchased; what he cannot change,
> Than what he chooses.

A delightful quotation from "The Winter's Tale":

> *Paulina.* Behold my lords,
> Although the print be little, the whole matter
> And copy of the father; eye, nose, lip,
> The trick of his frown, his forehead; nay, the valley,
> The pretty dimples of his chin and cheek; his smiles;
> The very mould and frame of hand, nail, finger;
> And thou, good goddess Nature, which hast made it
> So like to him that got it, if thou hast
> The ordering of the mind too, 'mongst all colors
> No yellow into; lest she suspect, as he does,
> Her children not her husband's!

In a somewhat different vein, a quotation from King John:

> *Bastard.* Madam, I was not old Sir Robert's son;
> Sir Robert might have eat his part in me
> Upon Good Friday, and ne'er broke his fast;
> Could he get me? Sir Robert could not do it;
> We know his handy-work; Therefore, good mother,
> To whom am I beholden for these limbs?
> Sir Robert never holp to make this leg.

Shakespeare also knew that sometimes there were exceptions to the rule, a reversal of hereditary law, as Miranda tells us in "The Tempest":

> Good wombs have born bad sons.

And in "Cymbeline" the following passage gives expression to the same thought:

> *Second Lord.* That such a crafty devil as is his mother
> Should yield the world this ass! a woman, that
> Bears all down with her brain; and this her son
> Cannot take two from twenty for his heart,
> And leave eighteen.

EPILEPSY

One of the unsolved problems of medicine is epilepsy; it is true that we know many things about this affliction, so did Shakespeare.

Neurologists speak of the epileptic facies and one of our modern writers has stated that it is possible to select from a group of chronic nervous patients the majority of the epileptics, by the appearance of their faces, alone. Yet Shakespeare may have known something of this, as he caused one of his characters to say,

> A plague upon your epileptic visage.

But this is not all, Shakespeare has given us descriptions of the epileptic fit, so accurate that one could hardly doubt but that he had personally witnessed such an occurrence. In "Othello" we find the following:

> *Iago.* My lord is fallen into an epilepsy:
> This is his second fit; he had one yesterday.
> *Cassio.* Rub him about the temples.
> *Iago.* No, forbear;
> The lethargy must have his quiet course:
> If not, he foams at the mouth, and by and by
> Breaks out to savage madness. Look, he stirs:
> Do you withdraw yourself a little while,
> He will recover straight.

And again in "Julius Caesar":

> *Cassius.* What! did Caesar swoon?
> *Casca.* He fell down in the market place,
> and foamed at the mouth, and was speechless.
> *Brutus.* Tis very like; he hath the falling sickness.

Even the postepileptic confusion is suggested in the words of Casca:

> When he came to himself again, he said, If he had done or said anything amiss, he desired their worships to think it was his infirmity.

ALCOHOL

As Shakespeare lived in a time and place untroubled by an eighteenth constitutional amendment, indulgence in alcoholic beverages was the rule, and overindulgence, I fear, common. It is therefore not surprising that the poet should make frequent reference to drinking, and cause one of his characters to be responsible for the following:

> *Porter.* and drink, sir, is a great provoker of three things.
> *Macduff.* What three things does drink especially provoke?
> *Porter.* Marry, sir, nose painting, sleep and urine.

In "Othello" we find some references to alcohol, oft quoted, especially by the prohibitionists.

> *Cassio.* O thou invisible spirit of wine,
> if thou hast no name to be known by,
> let us call thee devil!
> *Cassio.* Oh God, that men should put an enemy in their mouths to steal away their brains.

Before taking Cassio's temperance lecture too much to heart, it would be well to recall that this gentleman must have been unusually susceptible to alcohol; evidently having an idiosyncrasy for that particular beverage, for he tells us:

> I have very poor and unhappy brains for drinking; I could well wish courtesy would invent some other custom of entertainment.

And Cassio later adds:

> I have drunk but one cup tonight, and that was craftily qualified too, and behold what innovation it makes here. I am unfortunate in the infirmity, and dare not task my weakness with any more.

Turning from Cassio to Lady Macbeth, we find an entirely different type of individual, with a very different reaction to alcohol. Shakespeare doubtless had plenty of opportunity for clinical observation and was aware of the fact that not everyone reacts in a similar manner to intoxicants. Mayhap he even had some personal experience with the morning headache that is said to follow alcoholic overindulgence. But be all this as it may, he causes Lady Macbeth to orate as follows:

> That which hath made them drunk hath made me bold;
> What hath quench'd them hath given me fire.

PSYCHASTHENIA

Not only did our Elizabethan poet interpret and depict character to the great delight of generations, but his insight and analysis of the workings of the human mind is something at which to marvel as well as to enjoy. Shakespeare surely had no technical knowledge of psychasthenia with its obsessions, its phobias; yet he causes Constance, in "King John," to say:

> For I am sick and capable of fears.

And Shylock tells us:

> Some men there are love not a gaping pig:
> Some, that are mad if they behold a cat.

Not so many years ago the celebrated author and neurologist, Weir Mitchell, was interested in collecting instances of this same psychasthenic symptom, fear of cats, observed and recorded by Shakespeare centuries ago.

Another psychasthenic phobia is certainly suggested in one or both of two quotations; the first from "King Lear," the second from "Hamlet":

> *Edgar.* Come on, sir; here's the place! Stand still.
> How fearful and dizzy 'tis, to cast one's eyes so low!
> *Horatio.* Think of it;
> (The very place puts toys of desperation,
> Without more motive, into every brain
> That looks so many fathoms to the sea,
> And hears it roar beneath.)

Here we have acrophobia, or fear of high places with the impulse to jump off when standing on such a place, indicated in the latter quotation.

We find a reference to the power of the will in "Cymbeline," where Imogen says:

> I should be sick, but that my resolution helps me.

It may not be out of place here to insert a couple of quotations from "Antony and Cleopatra," which show an insight into the working of the *normal* mind.

> And quietness, grown sick of rest, would
> purge by any desperate change.
> Celerity is never more admir'd
> Than by the negligent.

While certainly the recognition of *abnormal* thinking is implied in the words of Camillo:

> Good my lord, be cur'd
> of this diseas'd opinion.

MENTAL ARREST

To one who for many years has taught the difference between the mind enfeebled from birth, and the mind departing from the normal by reason of illness, the clear cut statement in five words which we find in "Cymbeline," is peculiarly interesting. Imogen says:

> Fools are not mad folks.

Is it not probable that Shakespeare realized the difference between idiocy and imbecility on the one hand, and insanity on the other?

INSANITY

It is not the purpose of this paper to attempt to analyze the character of Hamlet, to psychanalyze Lady Macbeth or to hunt for real or imaginary complexes in any of Shakespeare's characters; but what of the madness of Ophelia and the feigned insanity of Hamlet? Does not the youth of Ophelia, with her profound emotional disturbance and detachment from the surrounding world, suggest some familiarity with the condition we now know as schizophrenia?

Hamlet in speaking of himself, says:

> I am but mad north-north-west; when the wind is southerly I know a hawk from a handsaw.

And Polonius remarks, in speaking of Hamlet's feigned insanity:

> Though this be madness, yet there is method in't.

From the above two quotations, is it stretching the point too far to think that the poet may have come in contact with the paranoid type?

I believe that we are all familiar with the conversation between Macbeth and the doctor, as they discuss the mental malady of Lady Macbeth, but let me recall a few passages:

Macbeth. How does your patient, doctor?
Doctor. Not so sick, my lord,
As she is troubled with thick-coming fancies,
That keep her from her rest.
Macbeth. Cure her of that.
Canst thou not minister to a mind diseas'd,
Pluck from the memory a rooted sorrow,
Raze out the written troubles of the brain,
And with some sweet oblivious antidote
Cleanse the stuff'd bosom of the perilous stuff
Which weighs upon the heart?
Doctor. Therein the patient
must minister to himself.

Do we not sympathize somewhat with Macbeth when he exclaims?

Throw physic to the dogs, I'll none of it.

And have we not a fellow feeling for the doctor, as he expresses his emotion in the words:

Doctor. Were I from Dunsinane away and clear,
Profit again should hardly draw me here.

Nowhere in literature, not even in the Bible, do we find so many and such remarkable descriptions of senility as we find in the writings of Shakespeare. Yet with all the keenness and accuracy of his delineation of the mind enfeebled by age, with what sympathy and understanding, what human touch, is this condition portrayed. Let me quote a few passages in illustration. The King, in "All's Well That Ends Well":

For we are old, and on our quick'st decrees
The inaudible and noiseless foot of Time
Steals ere we can effect them.

Polixenes, in "The Winter's Tale":

Is not your father grown incapable
Of reasonable affairs? is he not stupid
With age and altering rheums? Can he speak? Hear?
Know man from man? dispute his own estate?
Lies he not bed-rid? and again does nothing
But what he did being childish.

A contribution from "As You Like It": the last chapter from the familiar "seven ages":

Last scene of all,
What ends this strange eventful history,
Is second childishness and mere oblivion,
Sans teeth, sans eyes, sans taste, sans everything.

"Second Childhood" was an open and clearly read page to the poet, and we shall later see how he refers again to this old, timeworn simile for mental senility, in "King Lear." But first let us regard for a moment the delightful picture of normal old age in Adams' little sermonette in "As You Like It."

Though I look old yet I am strong and lusty,
For in my youth I never did apply
Hot and rebellious liquors in my blood,
Nor did not with unbashful forehead woo
The means of weakness and debility;
Therefore my age is as a lusty winter,
Frosty, but kindly.

Nor should the inimitable Dogberry be overlooked, for he tells us;

When the age is in, the wit is out.

It is in the tragedy of King Lear, however, that Shakespeare gives his finest description of senile dementia. First we have the realization by the monarch of his waning vigor, with the lines:

and 'tis our fast intent
To shake all cares and business from our age,
Conferring them on younger strengths, while we
Unburthen'd crawl toward death.

Then Goneril, in speaking of the king, her father, is made to say:

You see how full of change his age is;
He always loved our
sister most, and with what poor judgement
he hath now cast her off appears too grossly.

Next Regan, another daughter, adds her contribution:

tis the infirmity of his age.

Then Goneril:

then must we look
from his age to receive, not alone the
imperfections of long ingrafted condition,
but there withal the unruly waywardness that
infirm and choleric years bring with them.
Idle old man,
That still would manage those authorities
That he hath given away; Now, by my life,
Old fools are babes again.

In the second act of the play we are given a glimpse of the old King, realizing his increasing enfeeblement, but still manifesting a trace of his former dignity:

We are not ourselves
When nature being opress'd commands the mind
To suffer with the body

And Regan follows this with:

O, sir, you are old;
Nature in you stands on the very verge
Of her confine; you should be ruled and led
By some discretion that discerns your state
Better than you yourself.

Later Lear wanders about on the heath in a storm and Kent tells us:

The tyranny of the open night's too rough
For nature to endure.

Overexertion and exposure are thus added to the burden of a distressed and weakened intellect.

As the play draws to a close and the sand in the hour glass of life is running low for the ancient monarch, we are given the most pathetic and pitiful description of all:

Pray do not mock me
I am a very foolish fond old man,
Four score and upward, not an hour more or less;
And, to deal plainly,
I fear, I am not in my perfect mind.
Methinks I should know you and know this man:
Yet I am doubtful; for I am mainly ignorant
What place this is, and all the skill I have
Remembers not these garments, nor I know not
Where I did lodge last night. Do not laugh at me;
For, as I am a man, I think this lady
To be my child Cordelia.

Let us summarize the symptoms of senile dementia that Shakespeare has presented in his masterly portrayal of King Lear. Poor judgment, turning against the one most near and dear to him; unruly waywardness; disorientation as to time, place and identity; amnesia, with inability to recall the events of only a few hours before or to remember how he came by the very clothing he had on. Childishness in thought and speech, dementia; what more could one want in a clinical description of mental senescence?

THERAPEUTICS

Is not the power and healing of psychotherapy indicated in such passages as the following?

. . . I
Do come with words as medicinal as true,
Honest as ether, to purge him of that humor
That presses him from sleep.

Argument, persuasion and suggestion are the tools, the remedies of the psychotherapeutist; let us give our attention to Prospero, who says:

Let us not burthen our remembrances
With a heaviness that is gone.

Or to Paulina, in "The Winter's Tale," who tells us that:

What's gone and what's past help
Should be past grief.

Yet Shakespeare, were he alive today, would hardly have been a Freudian, if we may judge from Bottom's little criticism on the interpretation of dreams.

I have had a dream, past the wit of man to say what dream it was: Man is but an ass, if he go about to expound this dream.

And here is a quotation from "All's Well that Ends Well," that may be of interest to the Christian Scientists:

Our remedies oft in ourselves do lie,
Which we ascribe to heaven.

Shakespeare realized the value of time as a factor in the recovery from mental shock (psychic trauma), and causes Iago to say:

How poor they are that have not patience!
What wound did ever heal but by degrees?

The benefit of occupation for the nervous and mentally ill is universally recognized and admirably expressed by the poet in "Macbeth":

> The labour we delight in physics pain.

Even the effect of music upon the "mind diseased" was not unknown in the days of Shakespeare, and has recently, to judge from current medical literature, had more or less of a renaissance; but we wonder if King Richard could have been listening to jazz when he remarked:

> This music mads me, let it sound no more:
> For though it hath holp madmen to their wits.
> In me it seems it will make wise men mad.

The fact that one poison may neutralize or counteract the effects of another poison was known to Galen. In recent years witness the treatment of one infection, syphilis, by inoculation with the germ of another infection, malaria. That the poet must have had some knowledge of this principle is indicated in these lines from "Romeo and Juliet."

> *Benvolio.* Take thou some new infection to the eye,
> And the rank poison of the old will die.

Every neurologist appreciates the harm to his patients through insomnia and the great value of sleep as a therapeutic factor. Shakespeare has many beautiful lines about sleep and over and over again tells of its healing qualities. The dread of a sleepless night is well depicted by Helena in "A Midsummer Night's Dream."

> O weary night, O long and tedious night,
> Abate thy hours.

In the following quotations we find reference to the value of sleep.

> *Lysander.* sleep give thee all his rest.
> *Helena.* And sleep, that sometimes shuts up sorrow's eye,
> Steal me awhile from mine own company.
> *Iachimo.* The crickets sing, and man's o'erlabour'd sense
> Repairs itself by rest.

And last but not least, the well known quotation from "Macbeth."

> *Macbeth.* the innocent sleep,
> Sleep that knits up the ravell'd sleeve of care,
> The death of each day's life, sore labour's bath,
> Balm of hurt minds, great nature's second course,
> Chief nourisher in life's feast.

Let me digress at this point long enough to call attention to a discussion of the profession found in "All's Well That Ends Well":

> *Lafeu.* (speaking of the King) He hath abandoned his physicians, madam; under whose practices he hath persecuted time with hope, and finds no other advantage in the process but only the losing of hope by time.
> *Countess.* He and his physicians are of a mind; he, that they cannot help him;
> They, that they cannot help.
> *King.* But may not be so credulous of cure,
> When our most learned doctors leave us, and the congregated college have concluded
> That laboring art can never ransom nature
> From her inaidible estate.

Fortunately, the Countess presents another, far more flattering picture in speaking of one of our profession.

> Whose skill was almost as great as his honesty; had it stretched so far, would have made nature immortal, and death should have play for lack of work.

It has given me much pleasure to prepare this little sketch, which I trust has not been without interest to my readers; but I will now close, before I bore you to the extent of exclaiming with Pisanio,

> Doctor, your service for this time is ended;
> Take your own way.

So like Othello, I will say,

> Here is my journey's end.

PEEPS WITH PEPYS AT HYGIENE AND MEDICINE

By JEAN BROADHURST, PH.D.

NEW YORK

MOST of the recent interest in Pepys and his diary, new editions and parodies alike, is of the type that emphasizes the fact that he, too, "had eyes, hands, organs, dimensions, senses, affections and passions" and sometimes, unfortunately, merely senses and passions.

To the discerning eye, however, Pepys' diary[1] is full of interesting contrasts with our life today, especially in the fields of medicine and hygiene, contrasts which prove that we are not "fed with the same foods, subject to the same diseases, healed by the same means," or even "warmed and cooled by the same summer and winter"; for we flee in June to Maine or Canada or migrate every fall to Florida's sunny strands, while Pepys baked or froze "according to season" in England at a time when summer knew not the "clink of the ice" and ill-heated houses allayed but slightly the cold of the winter months.

It is easy to prove that we are not fed with the same foods. In Pepys' time food was food, and no consideration of calories, minerals or vitamines disturbed his gastronomic pleasures. Pepys' dietary was strikingly short on fruits and vegetables, and very long on meats. He mentioned nearly fifty cuts or types of fish and meats, from calf's heads and jowles of salmon, to botargo (a sausage of eggs and sea-mullet blood) and "a good hog's harslet" (haslet), which Pepys wrote, "I love." Several meats were served at a meal, even when Pepys dined alone with his wife. One menu, for example, lists seven fish or meat dishes, and Pepys writes of being

> Very merry at, before and after dinner and the more for that my dinner was great, and most neatly dressed by our own only mayde. We had a fricasee of rabbits, and chickens, a leg of mutton boiled, three carps in a dish, a great dish of a side of lamb, a dish of roasted pigeons, a dish of anchovies, good wine of several sorts, and all things mighty noble and to my great content.

At another time, he says his wife:

> Got ready a very fine dinner viz. a dish of marrow bone, a leg of mutton, a loin of veal, a dish of fowl, three pullets, and a dozen of larks all in a dish; a great tart, a neat's tongue, a dish of anchovies, a dish of prawns and cheese.

Sleep, bathing and other phases of personal hygiene afford just as strong contrasts to present day living. Pepys rose betimes as did his household. He writes:

> Oct. 6th. Slept pretty well, and my wife waked to ring the bell to call up our mayds to the washing about four o'clock, and I was, and she was angry that our bell did not wake them sooner, but I will get a bigger bell. June 13th. Up by four o'clock in the morning and read Cicero's Second Oration against Cataline; June 14th. Up by four o'clock and upon business at my office; June 17th. Up before four o'clock which is the hour I intend now to rise at, and to my office; June 29th (Lord's Day). Up by four o'clock and to the settling of my accounts. July 9th. Up by four o'clock and at my multiplication table hard, which is all the trouble I meet withal in my arithmetic;

Two days later, his mathematical progress is indicated by the entry:

> July 11th. Up by four o'clock and hard at my multiplication table, which I am now almost master of.

The morning bath and shave were not routine procedures in Pepys' time, and your cold shower would, no doubt, have killed Pepys, for he writes: "June 20th. I have of late taken too much cold by washing my feet and going in a thin silk waistcoat"; and later in the summer, even as late as July, "In mighty pain all night long, which I impute to the milk that I drank upon so much beer, and the cold, to the washing my feet the night before." Bathing, when practiced, seems to have been a much more momentous undertaking two hundred and fifty years ago, for Pepys writes "the barber came to trim me and wash me, and so to bed, in order to my being clean tomorrow." Another time he says that his wife spent the whole Lord's day "making herself clean, after four or five weeks being in continued dirt"; and again, that;

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[1] Everyman Edition, 2 vols.

> she is busy going with her woman to the hot house to bathe herself, after her long being within doors in the dirt, so that she now pretends to a resolution of being hereafter very clean. How long it will hold I can guess.

Nevertheless her standards seem to have been more exacting than those of Pepys, for one February night he writes, "Late home and to clean myself with warm water; my wife will have me, because she do use it herself." Even these occasional cleansing processes seemed too burdensome, and he considers buying periwiggs "meaning to wear one, the pains of keeping my hair clean is so great," though he wavers because of "the trouble that I foresee will be in wearing them also." The bathing appliances in use were usually of the simplest types, and Pepys describing a grand home, built by Povy, "which do surpass all that ever I did see" mentions only casually, "his bath at the top of the house."

You probably shave with a safety razor, but in 1662 Pepys writes: "Cut off all my beard, which I had been a great while bringing up, only that I may with my pumice stone do my whole face, as I now do my chin, and so save time, which I find a very easy way and gentile"; and later, we read:

> (Lord's Day.) To trimming myself, which I have this week done every morning with a pumice stone, which I learnt of Mr. March, when I was last at Portsmouth; and I find it very easy, speedy, and cleanly and shall continue the practice of it.

But Pepys learned to use a razor, for two years afterward he writes:

> This morning I began a practice, which I find, by the ease I do it with, that I shall continue, it saving me money and time; that is to trimme myself with a razer; which pleases me mightily.

What would Pepys have said if you had handed him a safety razor and a tube of shaving cream? If Mrs. Pepys had had access to the "Beauty counter" of a modern department store, would she have lost her "beauty sleep" for the sake of collecting May-dew of which she apparently made a serious business, for we find:

> May 10th. Troubled about three in the morning with my wife's calling her maid up, and rising herself to go with her coach abroad, to gather May-dew; . . . May 11th. My wife again up by four o'clock, to gather May-dew.

Cleanliness was not a close second to godliness in those days. The Reformation, apparently, did not extend that far! Vermin were sources of merriment rather than disgust or shame, for on their way to Bristol by coach Pepys comments, "Up, finding our beds good, but lousy; which made us merry." At another time he says, "I have itched mightily these 6 or 7 days, and when all comes to all she [his wife] finds that I am lousy, having found in my head and body about twenty-five, little and great, which I wonder at, being more than I have had, I believe, these 20 years." Fleas, too, seem to be taken as a matter of course, and Pepys mentions them most casually, commenting, for example, upon a sleepless night, for which his wife "chid her mayds for not looking after the fleas a days."

Bedtime preparations, too, were reduced to a minimum and even prayers were slighted on occasion, for Pepys writes: "to bed without prayers it being washing day to-morrow." The same underclothing served for warmth both day and night, apparently, for we read: "April 25th. This day I did first put off my waste-coate, the weather being very hot, but lay in it, at night, and shall, for a little time"; on May ninth, he left off his "waistcoat by night, it being very hot weather, so hot as to make me break out, here and there, in my hands, which vexes me to see, but is good for me"; and even as late as June, Pepys says: "I lay in my drawers and stockings, and waistcoat." In 1664 Pepys complains in his diary of "having got a strange cold in my head, by flinging off my hat at dinner, and sitting with the wind in my neck." Think you he would have risked the breezes on your modern sleeping porch?

Sheets, blankets, pillows, all the types of bedding familiar to us are mentioned, and once Pepys tried a feather bed as a covering, concluding "though I lay the softest I ever did in my life, with a down bed, after the Danish manner, upon me, yet I slept very ill." Hangings or curtains enclosed the beds of the well-to-do, but Pepys slept one night at the home of William Penn's father and slept "pretty well" despite the fact that there were no curtains or hangings on the bed, and he had to go for "the first time into a naked bed." Apparently the beds of this period had appurtenances wholly outgrown by our time, for in 1662 Pepys recorded "to bed this night having first put up a spitting sheet which I find very convenient," and a contemporary mentioned in his will "one pair of spitting sheets now used on my bed." Today when spitting is tabooed because of the danger of spreading tuberculosis and other diseases of the throat and lungs, it is almost as much of a shock to read this as it is to read of Pepys' experience at the theatre: "and here I sitting in a dark place, a lady spit backward upon me by mistake not seeing me."

If, like Mark Twain's Yankee, we could go back for a day with Pepys to his London, a rainy day would be an unfortunate choice without such modern inventions as umbrellas, rain coats or overshoes to help conserve our health. Pepys complains, "a most rainy afternoon, and I forced to go to the office on foot, was almost wet to the skin, and spoiled my silk breeches almost"; and one night he and Mrs. Pepys were rainbound at the theatre, and waited an hour and a half, talking to crowds of other storm-bound patrons, before they dared venture out into the downpour.

One reason Pepys avoided going abroad, in rainy weather, was the poor condition of the roads. In wet weather they were more like ditches than the smooth asphalt or cement surfaces of today. Pepys describes "my Lady Batten walking through the dirty lane with new spick and span white shoes, she dropped one of her galoshes in the dirt, where it stuck, and she forced to go home without one, at which she was horribly vexed." Pepys found night travelling not only difficult but dangerous, and writes, after hunting for his coach in the darkness, "I could not find it, so I fain to go through the dark and dirt over the bridge, and my leg fell in a hole broke on the bridge." When travelling, Pepys and other travellers dutifully tipped the "menders of the highway" and we find an occasional sixpence or shilling thus accounted for, but their services were far from satisfactory, for Pepys complains often of the road: that "the dirtiness of the road do prevent most of the pleasure"; "nothing but rain, insomuch that the ways are mighty full of water, so as hardly to be passed"; the way being so dirty, an stopped up with rayles . . . I could not go home"; and, journeying to Wisbeach, "much ado through the fenns, along dikes, where sometimes we were ready to have our horses sink to the belly."

The coaches and "chairs" of the seventeenth century have a "grand" sound to our ears, but you doubtless would much prefer your own motor car with its shock absorbers or air-buoys; for Pepys reports a "tryal of some experiments about making of coaches easy. And several we tried; but we did drive mighty easy, not here for me to describe, but the whole body of the coach lies upon one long spring and we all, one after another, rid on it and it is fine, and likely to take." Later he discounts, somewhat, this first optimistic view when "after dinner, comes Colonel Blunt in his new chariot made with springs . . . So for curiosity, I went into it to try it, and up the hill to the heath and over the cart ruts and found it pretty well, but not so easy as he pretends."

A still greater contrast with Pepys' time is to be found in the diseases which frequently decimated England and indeed all Europe. The number of pock-marked people would have puzzled you, had you walked abroad with Pepys, for in 1664 the smallpox "spoiled" so many people that Pepys doubted whether "hardly ever was remembered such a season for smallpox, as these last two months have been, people being seen all up and down the streets, newly come out after the smallpox." However, it was ignorance, not prejudice which was responsible for the prevalence of smallpox, continuing to "spread it mightily"; and, so great was the dread of smallpox, that had vaccination, or the earlier oriental method of inoculation, been known then, Pepys and his fellow citizens would have made short shrift of all "conscientious objectors" who refused such preventive treatment. There, too, we have a striking contrast with today for you, your city and your state, can choose whether you will have smallpox or not, as shown by the fact that in 1927, Vermont had no cases of smallpox, while Indiana, with about the same population, had 4809 cases.

Had you chosen to visit Pepys four or five years later, during the great plague you would have found Pepys truly frantic. Admission might have been denied you, though quarantine was very loosely practiced in Pepys' day. Even when his "boy" was taken ill with what seemed to be smallpox, Pepys never considered withdrawing the dinner invitations he had just issued, although later when the Great Plague struck all London with fear, he objected to his wife's contemplated farewell party and insisted that they "uninvite the guests."

Knowing nothing of the methods of disease transfer, their occasional efforts at disinfection and quarantine were usually misapplied. The plague, which is transferred solely by the bites of fleas, was of course unchecked by the many plans which were tried. Pepys drank "strong water" and wore plague "plaister," but did not rely greatly upon such protection, nor upon the "monthly fast-day" instituted by the church; and as the graves began "to lie high upon the churchyards," many being buried in one grave, he became "solicitous to have the churchyards covered with lime," though he was later comforted by a night of frost and snow which covered the graves in the churchyard, and made him "less afraid for going through." A general quarantine was finally imposed, and vessels from Amsterdam and other infected places were required "to perform their quarantine for thirty days . . . contrary to the import of the word, though, in the general acceptation, it signifies now the thing, not the time spent in doing it . . . a thing never done by us before." As additional safeguards, "plaister and fume" were used by individual householders, and fires were kept burning in the streets, by the Lord Mayor's order, "all the way fires on each side of the Thames."

Pepys deplores the madness of the people who at first came "in crowds along with the dead corpses to see them buried," but there seems to have been very little real control of the movements of the people, although as the epidemic spread, according to Defoe, hackney coaches carrying infected persons to the pest-house and other places were not "admitted to common use, till their coaches be well-aired and have stood unemploy'd by the space of five or six Days after such Service." Infected houses were "marked with a red Cross of a Foot long, in the middle of the door, evident to be seen, and with these usual printed Words, that is to say, 'Lord have Mercy upon us,' to be set close over the same Cross, there to continue until lawful opening of the same House." Two watchmen were stationed at each plague-infected house, to make sure that no one left the house until "four weeks after all be whole." As the plague spread, the deaths exceeding 8,000 in a single week, localities attempted rigid quarantine against each other and Pepys was deeply affected by the following tale:

> A saddler in Gracious Street who so desired to save the life of his child that he arranged to have it received stark-naked into the arms of a friend, who brought it, having put it into new fresh clothes, to Greenwich; where, upon hearing the story, we did agree it should be permitted to be received and kept in the town.

All unguessed at, this lenity on the part of the officials was justified, for it was preceded by the only adequate preventive measure ever mentioned by Pepys, the plague-infected fleas having been removed with the clothing! However, believing with most of his fellow citizens that the breath of plague-stricken people was poisonous and could instantly kill small animals, such as birds and chickens, the Lord Mayor commanded "people to be within at nine, at nightfall, as they say, that the sick may have liberty to go abroad for ayre." Pepys worried greatly about those ill with the plague who, for spite, blow their breath out of the windows into the faces of well people going by, and mentions fleas only casually, as already described, for example, when his wife "chid her mayds for not looking after the fleas a-days."

"Healed by the same methods" is also far from true. The herbals of Pepys' time abound in "cures" now beyond belief, such as fig leaves for warts, "if they are afterward buried in the ground," or "earth worms, an admirable remedy for cut nerves, being applyed to the place." Pepys treasures one "charme for burning":

> There came three Angells out of the East,
> The one brought fire, the other brought frost
> Out fire; in frost;
> In the name of the Father, and Son, and Holy Ghost.

"Mind over matter" was relied upon all too often, and Pepys writes respectfully, intending no pun, of a woman who "did turn a piece of roasted mutton into pure blood, which was very rare." He also has a few useful standbys, such as alum and blood-letting. He "puts alum to my mouth where I have the beginnings of a cancer (canker) and had also a plaster to my boil underneath my chin." Most of his remedies are less sensible, for he drinks milk to cure indigestion or "heartburne" takes turpentine pills for his general health, and "strong water" for the plague, and treats the black eye he gave his wife with "butter and parsley." For his failing eyesight, he tries various treatments, his case being truly desperate: "four pills of Dr. Turberville's prescribing"; eight days later he "was let blood and did bleed about fourteen ounces, towards the curing of my eyes"; and two weeks later, at his beltmaker's, finding that "the mistress of the house, an oldish woman in a hat, hath some water good for the eyes, she did dress me, making my eyes smart most horribly, did give me a little glass of it, which I will use, and hope it will do me good."

Blood-letting was applied in any and all emergencies: to help Pepys' eyes as described above, to cure the Duke of York of smallpox, and as a general precautionary measure, as when Pepys, "being exceeding full of blood, and very good" had "Mr. Holliard come to me and let me blood, about sixteen ounces," when he says, "I begun to be sick; but lying upon my back, I was presently well again, and did give him 5s. for his pains." Evelyn, bled at the beginning of an attack of smallpox, was congratulated therefore by his physicians, who found his blood "so burnt and vicious as it would have prov'd the plague or spotted feaver had he proceeded by any other method." Even horses were bled, and when one of the Pepys' coach horses was ready to fall down in an attack of "staggers," the "coachman was fain to 'light, and hold him up, and cut his tongue to make him bleed, and his tail; then he blew some tobacco in his nose, upon which the horse sneezed, and by and by, grew well, and drew us all the rest of our way, as well as he ever did."

Pepys watched the King "touch" for

the "King's evil," the "first time that ever I saw him to it; which he did with great gravity, and it seemed to me to be an ugly office and a simple one." But, although the King's touch impressed Pepys as "simple," he speaks feelingly of his own "cure-all," a hare's foot "which is my preservation, for I never had a fit of collique since I wore it, or whether it be my taking of a pill of turpentine every morning." Belief in the efficiency of a hare's foot is strong, however, for Pepys writes later.

Pepys, in "Perriwigg" and "False Taby Wastecoate with Gold Lace" and the "Close Bodied, Light Coloured Coat, with Gold Edging That was the Lace of My Wife's Best Petticoat When I Married Her," Homeward Bound, with Hooke's *Micrographia* in One Hand and the Hare of the Charmed Foot in the Other.

> Homeward, on my way buying a hare and taking it home, which arose upon my discourse with Mr. Ballin, at Westminster Hall, who shewed me my mistake, that my hare's foot hath not the joint to it, and assures me he never had his collique since he carried it about him, and it is a strange thing how fancy works, for I no sooner handled his foot, but I became very well, and so continue.

All healing was at a low level apparently, for fees for nurses and physicians were unbelievably low and paid most grudgingly. In an emergency Pepys finally became desperate, and offered the only nurse he could find "20 s. per week, and we to find clothes, and bedding, and physick, and would have given 30 s." Recovery from illness was still too much a matter of chance to give physicians anything like the respect accorded them today. The chaplain of the Duke of Albemarle dared to say "all our physicians can not tell what an ague is." Even the fleet, upon which the very existence of the English nation depended, had no physician in charge until the Duke of York proposed his physician as "Physician general of the fleete, for which," says Pepys, "there never was any precedent in the world, and he for that to have £20 a month." What Pepys thought of surgery is shown by his account of the famous Ned Mullins who by "a slight fall broke his leg at the ancle, which festered; and he had his leg cut off on Saturday, but so ill done, notwithstanding all the great chirurgeons about the town at the doing of it, that they fear he will not live with it." Without anesthetics and disinfectants the surgery of the 1660's was little more than butchery. Evelyn, Pepys' contemporary, watched a

> Chirurgeon cut off the leg of a wounded sailor, the stout and gallant man enduring it with incredible patience, without being bound to his chaire as usual on such painful occasions. I had hardly the courage enough to be present. Not being cut off high enough, the gangreen prevail'd, and the second operation cost the poore creature his life.

Pepys witnessed two early experiments with opium, forecasts of anesthetic surgery: one where the opium was "let into the hind leg of a dog," and one where it was given by mouth. Our common anesthetics were all developed much later, ether being first used for that purpose in America in 1842 and publicly demonstrated and thereby made generally known in 1846; and it is easy to understand why Pepys goes to his office when his wife has "the tooth-ake" and the surgeon comes to pull her tooth.

What knowledge physicians then had of the human body was anatomical, not physiological. Harvey had already determined that the blood circulated in the body, but what the blood carried through the body, why circulation was essential to life, was wholly unknown. Oxygen was not discovered until 1774, a hundred years later, and no one guessed the interrelation of respiration and circulation. Pepys reports a discourse of the president of the College of Physicians concerning breathing: "What respiration is is not to this day known, or concluded on, among physicians, not to be done either, how the action is managed by nature, or for what use it is." The disease-resisting power of the blood was also "not yet concluded on," and in all real emergencies, patients were bled and deprived of much of its beneficial power. Yet Pepys glimpsed the twentieth century marvels of antitoxins and antisera for he makes interesting conjectures about the possibility of transferring blood from well to sick people, and in 1666 he describes:

> A pretty experiment of the blood of one dog let out, till he died, into the body of another on one side, while all his own run out on the other side. The first died upon the place, and the other very well, and likely to do well. This did give occasion to many pretty wishes . . . but as Dr. Croone says, may if it takes, be of mighty use to man's health, for the mending of bad blood by borrowing from a better body.

Two days later, Pepys reported:

> Met with Mr. Hooke and he tells me the dog which was filled with another dog's blood, at the College the other day, is very well, and like to be so as ever, and doubts not its being found of great use to men; and so do Dr. Whistler who dined with us.

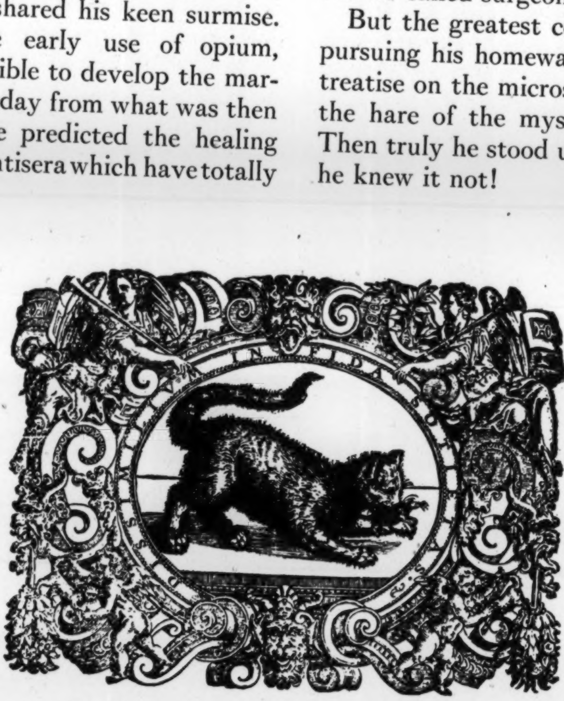
Modern diagnosis is so dependent upon blood examinations and other microscopic findings that it is interesting to find that Pepys owned a microscope. In 1664 a Mr. Reeve delivered one at his house, for which Pepys "did give him £5 10s, a great price, but a most curious bauble it is, and he says, as good, nay, the best he knows in England." Pepys found at his bookseller's "Hook's book on Microscopy, a most excellent piece and of which I am very proud," and which he mentions later with great enthusiasm:

> Jan. 21st. To my office till past 12 and then home to supper and to bed, being now mighty well, and truly I cannot but impute it to my fresh hare's foot. Before I went to bed I sat up till two o'clock in my chamber reading of Mr. Hooke's Microscopical Observations, the most ingenious book that ever I read in my life.

But how far his entertaining toy is from the scientific tool of today, how little Pepys would have thought of applying the microscope to any such practical use, as disease determination, is shown by the fact that as Pepys wrote the above tribute to microscopy he was wearing a hare's foot to ward off any possible disease. In fact, he bought the hare, which was to supply him with hare's foot of proper length, the same afternoon he bought the treatise on the microscope. And neither Pepys nor any of all he met in London's busy streets that afternoon realized that side by side he carried the hare's foot of superstition and a descriptive tool of scientific procedure which would revolutionize medicine, as well as every other biological science.

When upon the peak in Darien, Balboa, his back to the Atlantic, stared amazed at the unknown Pacific, his men "stood silent" and "looked at each other with wild surmise." Pepys, like Balboa, had his revelations on Darien, but no one saw with him the boundless possibilities opening before them and no one shared his keen surmise. He witnessed the early use of opium, which made it possible to develop the marvelous surgery of today from what was then sheer butchery. He predicted the healing possibilities of the antisera which have totally replaced the blood-letting of the barbers and so-called surgeons of his time.

But the greatest contrast of all is Pepys pursuing his homeward way, the treasured treatise on the microscope in one hand and the hare of the mystic foot in the other. Then truly he stood upon Darien, and even he knew it not!



A SHORT ACCOUNT OF PEPYS' OCULIST, D'URBERVILLE, AND HIS FAMILY

By ROBERT L. PITFIELD, M.D.

PHILADELPHIA

IT is recorded in the Spurious Battle Abbey Rolls that Sir Payan D'Urberville, a Norman Knight, fought under the banner of William I at Hastings in 1066. Like many another of the invaders he found the new country an excellent one in which to settle with many opportunities to live among the Anglo-Saxons as a feudal lord. It is more than likely that this stalwart half savage nobleman was in high favor with his sovereign and in return for his services received a grant of land. From his loins sprang many generations of noblemen, all bearing his name (later Anglicized to Turberville). It is thought that this man took his name from the town of Troubleville (Eure), in Normandy. It is more than likely that the knight and his descendants lived by soldiering, rapine, oppressing the poor and collecting tithes, rents and taxes with ruthless hands. The meager accounts of their lives and the few inscriptions upon tombs and other monuments that have survived the various political and religious revolutions and uprisings, do not record any great constructive tendencies by them. History tells of their feats at war and of their loves and the splendor of their establishments, but recounts very little of benevolences. Many other noble families founded monasteries, hospitals and abbeys, some of which survive to this day. Notable among them is the gift of a warrior and crusader to the city of London, who founded St. Bartholomew's Church and hospital, both of which are in active service today. Many of the Turbervilles were, in a way, professional soldiers, and adventurers; it is rare that men of this type are ever benevolent or otherwise constructive.

Among the descendants of Sir Payan was Henry, who was a loyal follower of King John. He was famous as a soldier and served as governor of towns and provinces in Normandy during the reign of this monarch. In Bere Regis, John established a hunting lodge which later became, according to Sir Frederick Treves, a Fontainebleau. From it many a hunting party and military foray set forth headed by the king and his retinue. Henry was rich enough and perhaps politic enough to found a manor house for the Knights Hospitallers. Much later another of the family, Sir Robert was made a knight, by Charles II, for loyalty to him.

In the little town of Wool in South Dorsetshire there still stands an ancient manor house of the Turbervilles, of Jacobean architecture. Its situation on the river Frome is charming, the reflections from the chimneys cross the sparkling ripples of this stream so near is it to the water. Thomas Hardy, the novelist, whose knowledge of the Turbervilles is quite exact, uses this mansion as the scene of the wedding night of Angel Clare and his bride Tess. It will be recalled by those who have read this powerful novel (Tess of the D'Urbervilles) that Angel shows to his bride two portraits of her ancestors, that still hang on the stairway of the old house, framed in masonry. Hardy uses these portraits of the stern, proud faced women, to sadden the bride on her wedding night, with telling artistry. Hardy says of these pictures "they represent women of middle age, the long pointed features, narrow eyes and the smirk of one suggestive of merciless cruelty; the bill hook nose, large teeth, bold eye of the other suggest arrogance to the point of ferocity." This single sentence conveys the impression of half suppressed savagery that no doubt characterized all of this vigorous, proud family, in those days.

Besides these few relics in Bere Regis some trifling grass covered mounds and the bald outlines of the foundations of the once splendid manor house are all that mark the place where kings were entertained.

In the handsome old church in Bere are the tombs of the Turbervilles (the Bere branch). Fourteen generations of them lie beneath the floor in the family vaults. A despoiled canopied tomb of Purbec marble stands in the south wall, above it is a splendid stained glass window in which fourteen shields bearing the crimson lion rampant amid traceries represents many family heads.

In the British Museum I found the tree of this family. There were nineteen generations, the last of the family was a woman who married an obscure man named Lucat. Among those who added a little glamor to the Turbervilles was a poet, Sir George. He was a good scholar, a graduate of Oxford, a romantic but unoriginal poet and lived in the time of Shakespeare and was perhaps known to the great man.

He wrote in a rather pedantic vein, knowing Greek and Latin his poems often contain allusions to classical subjects. He traveled some in Russia and was attached to the English embassy in Moscow. He wrote an account of his life in that country. Nathan Drake a critic of late date who wrote "Shakespeare and His Time" says of his poetry "occasional felicity of diction, and display of classical allusion and imagery taken from the amusements and customs of the age are not wanting, but the warmth, the energy and the enthusiasm of poetry are sought in vain."

Specimens of his verse can be found in some anthologies and in Chambers Encyclopedia of British Verse. He died in 1610.

Another of the family, James, took holy orders and became Bishop of Exeter. His episcopate was much discredited by the execution of one Agnes Pirest, "for religion and heresy." She was burned by order of this ecclesiastic at Southampton.

Another was a rogue and lived by his wits. He was a renegade Romish priest, who conspired along with the infamous Oates to play the rôle of informer, for money. It was the false testimony of Oates supported by Dugdale and this unprincipled Turberville, that led to the conviction of the unhappy William Howard, Viscount Stafford. After his conviction Stafford predicted to Burnet the early death of this rogue. His prediction came true and shortly he died of smallpox.

Besides the Bishop, the rogue and the Oxford scholar there remains a doctor, one D'Aubegney D'Urberville who when he died, at a great age, left behind him a good reputation as an oculist, a fortune and a carved tomb in Salisbury Cathedral. He was born in Wayford, Somerset in 1612. He attended Oriel College Oxford, entering in November, 1634, and graduating in October, 1635 with a degree, B.A. During the rebellion he fought on the side of Charles and assisted in the defence of Exeter. After the surrender to Fairfax he retired to his native village and practiced medicine.

It was while he was besieged in Exeter that he and a friend ran into debt to the sum of one hundred pounds chalked up on a door, as is still the fashion in some inns of England. The landlord leading his daughter by the hand courteously proffered her hand to cancel the debts if either should marry her. Turberville refused to yield to such a temptation but his friend succumbed to the landlord's suggestion and the debt was wiped off the door with a dishcloth. Turberville subsequently paid his score.

Later he removed to Salisbury and thence to London. In 1660 at the Restoration he took his M.D. degree in Oxford. In Salisbury where he practiced as an oculist he obtained such a reputation that he moved to London where he practiced until his death. He cured Queen Anne when she was a child of a "serious inflammation of the eyes, when the court physicians failed to do so." This established his reputation.

The court physicians despised Turberville looking upon him as a country quack. He quarreled with them and refused to meet them in consultation and won the day. His success was such that the Duke of York, uncle to the little princess ordered that six hundred pounds should be paid to him. He received but half of this amount.

He died in Salisbury in 1696 and is buried there. His wife Anne had no issue.

Ophthalmology in the days of this man was not far removed from dignified quackery. The real birth of the science was not until two hundred years later in the nineteenth century. The fame and good reputation of this man was such that his fellows in medicine referred many cases to him. Pope says:

> Many years after this, one of the greatest and ancientest peers of the kingdom summoned him up to London to whom after he had carefully inspected his eye, he spoke after this manner "My Lord I might bear you in hand ('a western frase signifying to keep in mind') and feed you with promises or at least hopes that I could cure you in some competent time and so cause your Lordship to be at great expense. I cannot cure you and I believe that no one in England can."
>
> The Earl answered "such and such will undertake it for one hundred pounds." To which the doctor replied "I have so great an honour for your Lordship . . . that I will give one hundred pounds out of my own purse to the person who shall restore your sight in that eye."

Probably the most noteworthy of his patients and the one who perpetuated his name was Samuel Pepys, the diarist.

He is known because of his long and interesting diary which he kept in cipher for many years. Some editions of this work are in 10 volumes. From the trifling nature of many of the entries and from his frequently expressed love of pleasure, the casual reader might hastily infer that the diarist was but a dilettante in music, something of a politician and idler in fashionable court circles, a lover of fine wines and expensive clothing and a good deal of a fop. He was no fool however. He began life as the son of a tailor and rose to be Secretary of the Admiralty, a position of great influence. For a long time he sat in the House of Commons. David Hume says of him in his history, "his administration (of naval affairs) is still regarded as a model of order and economy."

Of the reign of the infamous Charles II little can be said that was either constructive or good. It has been noted by many historians that the greatest accomplishment in the incumbency of this monarch was the high degree of efficiency at which the navy was maintained during his reign.

Pepys made a famous speech before Parliament in defense of himself and his underlings in the Admiralty who had been accused of corruption by the Commons. A contemporary declared this effort to have been the best speech ever delivered before parliament up to that time. Pepys notes all this most naively in his diary.

The weaknesses of the man are displayed on many pages of his records. He was fond of singing in taverns and in grottoes with convivial companions. He delighted in good food but always preferred to dine in company. He loved good wine and pretty women much to a certain green eyed infelicity in his home, all of which he naively records. He was considered a good judge of acting and frequently attended the first night of a play, especially if an actress named Knipp was in the company.

Pepys was rich and adorned his person in gorgeous velvets and fine laces, as did other gentlemen of his day, and he wore a long curled wig. He was amiable and generous, of his follies he often repented. He went to church very regularly and thought himself to be a good judge of a sermon. He was once charged with high treason and lay in the Tower for sometime but he was never brought to trial and was later released.

It is because he was so naively human that his diary is so interesting. He had considerable musical ability for he wrote songs and set them to music. He was looked upon as a good critic and because of his talent he became a member of the Royal Society. Later he was elected to the presidency because of his literary gifts and held this office two years.

When he was about forty-four years of age, Pepys began to complain of his eyes. He does not describe his symptoms, but he makes frequent entries in his diary about "my poor eyes." Seven years previous to the first entry about his eyes, he notes that in firing a cannon on the ship on which he was stationed, in honor of the restoration of Charles II, he nearly lost his right eye through carelessness. It is likely that he may have had an early presbyopia for he was a great reader, frequenting book shops and sitting until the early morning reading by poor candle light. It must be borne in mind that he lived in the days of poor paper and wretched type, and no doubt suffered from eye strain.

His first interview with Turberville is mentioned in his diary under date of June, 1667. "My business was to meet Mr. Boyle, which I did, he discoursed about my eyes, he did give me the best advice he could, but refers me to one Turberville of Salisbury lately come to town, who I will go to." It is likely that associated with his presbyopia he might have had some conjunctival trouble. It is not likely, but never the less possible that a pure refractive error might have been treated by Turberville with physic and eye lotions. His next entry reads, "To Dr. Turberville about my eyes whom I met with and he did discourse, I thought, learnedly, about them: and takes time before he did prescribe me anything to think of it."

A week after this "to an ale house met Mr. Pierce the surgeon and Dr. Clark Waldron and Turberville my physician for the eyes and Dr. Loure to dissect several eyes of sheep and oxen with great pleasure and information. But strange that this Turberville should be so great a man and yet to this day had seen no eyes dissected but once, but desired Dr. Loure to give him the opportunity to see him dissect some." A later entry in the diary reads, "About four in the morning took four pills of Dr. Turberville prescribing for my eyes and I did get my wife to spend the morning reading of Wilkins Reall Character."

Six weeks after the first visit to the oculist he records "Lord I am troubled about my eyes." In 1669 two years after this he had to retire from his duties for some time on account of his poor eyesight.

Turberville died at the age of eighty-four years, he left a respected name and a considerable fortune. His sister Mary inherited all his secret prescriptions, and knowing how to apply the remedies practiced for years in London enjoying a good reputation.

Of Mary's skill as an oculist, Pope is most enthusiastic, "for my part I have so good an opinion of her skill, that should I again be afflicted with sore eyes, which God forbid, I should rely upon her advice rather than upon any pretender or professor in London or elsewhere."

Turberville's name does not figure on the rôle of the College of Physicians nor on that of Barber Surgeons Company.

The chief account of his life can be found in a very scarce book, "Walter Pope's Life of the Bishop of Salisbury, 1697." The author devotes a whole chapter to the distinguished oculist whose skill cured Pope. The latter says "It was he who twice rescued me from blindness which without his aid would have been unavoidable, when both eyes were so bad that with the best I could not perceive a letter in a book and not my hand with the other, and grew worse and worse every day."

It must have been a crude kind of ophthalmology that this man practiced, much of it was no doubt founded upon superstition and folk lore. His knowledge of eye diseases was not much more extensive than that of a corner druggist of today, save that in all likelihood he knew how to make some simple but bunglesome refractions. It is more than likely that many of his methods were harmful, producing new infections and aggravating others. By some happy chance the virtues of a nightshade infusion or poultice of the leaves might have been revealed to him by a midwife in the village in which he first ventured upon his career. We all recall how Withering, led by such an agency introduced the use of digitalis into medical practice. It is likely too that he may have unwittingly induced severe but beneficial reactions by blind chance. It is very certain that he used drastic purges, indeed the four pills that Pepys writes of were no doubt purgative. Most of the huge draughts and purges of his day contained mercury. It is possible that he thus may have cured or helped syphilis of the eye unwittingly. His purgations and mercury may have helped an iritis now and then. He may have blunderingly cured a gonorrheal ophthalmia by the use of strong solutions of mercury or antimony instilled in the eye. He had some knowledge of spectacles, such as they were.

Roger Bacon discovered convex lenses in the twelfth century, concave soon followed. Astigmatism was not discovered until 1827, when Sir G. Airey, an astronomer, corrected his own error by the use of cylinders of his own devising. Of such a simple phenomenon as accommodation, Turberville knew nothing.

Dr. Walter Pope says of his ability as an operator,

> He cured several who were born blind but I do not look upon that as so great a thing for the cure of such if curable, for there are several sorts of cataract incurable, it consists wholly in *viz.*, to know when the connate cataract is fit to be couched, in having a steady hand and skill to perform that operation, to be able to prevent or at least remove the pain which usually follows and sometimes kills the patient; but to reduce the fallen or inverted eyelids to their proper place and tone, to cure inveterate ulcers and inflammations of blackish colour requires a consummate artist, *Hic labor boc opus est.*

The old fashioned seton well known to our immediate forefathers may have been used by this man. Formerly the action of this device was thought to be counterirritant. Viewed in a more scientific light, it is probable that the infected strip of linen pulled to and fro in a dirty wound may have acted by producing a kind of proteid shock. It is folly to speculate more about his therapy.

Turberville no doubt had an extensive practice and was a fashionable vogue.

Patients came to him from all over the country and from abroad. One woman hearing of his skill journeyed from Jamaica, Turberville cured her, but before she could return home she died of smallpox.

He was modest, this Turberville, part of the treatment that he prescribed for nearly everybody was to take a little tobacco and to have the head shaved. Of the tobacco he says he never knew it to harm the eyes, it did much good. When he who knew little of the normal functions of the eye and less of its anatomy and pathology, "talked learnedly," to Pepys about eye disease, he talked bunkum. No doubt he spoke in a dignified and pedantic manner, such was the way of physicians of that day. Pepys lived to the age of seventy years, he makes little mention of poor sight after 1669 and he pursued an active and useful life until his end, it is not likely that he suffered in his latter years from his eyes.

In dealing with prospective patients Turberville never bargained, for so much in hand, at the commencement of treatment and the rest when the cure was accomplished. In this he was far above the quacks of his day. It was during the eighteenth century, in London, that pedants of this character flourished. There are accounts of three who pretended to be oculists. There were two, Sir William Reed and Roger Grant who were unblushing humbugs with no education or other training. Chevalier Taylor was "a prince of humbugs." To quote Pope, "albeit being a surgeon and no fool . . . but a charlatan and past master in the art of self advertisement."

The city of Salisbury prospered because of this eminent man, his patients being lodged in inns and private dwellings. Pope says "one could scarcely peep out of doors but have a prospect of some led by boys, others with bandages over their eyes and yet a greater number wearing green silk upon their faces . . . a stranger might have reported the air of Salisbury as pernicious to the eyes."

Pope says that he was "kind and charitable as every good doctor is." Far from being covetous he cured the poor, gratis and received from others what they pleased to give him. From Pope himself he would accept no money, when pressed he accepted a tobacco box, a cane or a new book.

The reputations of the knights, the poet, the bishop, the rogue, and the doctor go glimmering down the dim past, no one remembers them now. Hardy revived an interest in the Turberville family and he has made some of their traits and habits most vivid. The doctor left no discovery by which he is remembered.

Pope wrote an epitaph for his benefactor's tomb in Salisbury Cathedral out of gratitude to perpetuate the name and the memory of him who was so skillful. It is a long inscription. The tribute begins with this phrase, "Adieu my dear friend *a rivederci* till we meet and see one another with eyes that will never stand in need of a collyerium."

The inscription continues with "near this place lies interred the most expert and successful oculist that ever was and perhaps ever will be."

Note. After sending the above to the printer, I stumbled upon the fact that two eminent British oculists have ventured to give opinions upon what kind of eye trouble afflicted Mr. Pepys. Sir G. D'Arcy and W. W. James have both written articles expressing their rather different views. These I find shed considerable valuable light upon the matter of the diarist's disability. I also found after more diligent research, more interesting entries in the diary which I had not uncovered in the lengthy work. I feel that these facts should not be omitted and I therefore append them.

An entry of April 1662 reads, Portsmouth, "Of the healths that I have been forced to drink" his eyes seemed to him to suffer. On his return to London he was bled sixteen ounces by one Dr. Holliard who received five shillings for his services.

1666 "Mr. Crocker to see me about a globe of glass and frame of oyled paper to lessen the glaringness of it" (light).

1666 "My right eye seems full of humour of late. I think by my late change of my brewer."

December 1666 "I this morning did buy me a pair of green spectacles to see whether they will help my eyes." 1667 "being weary and almost blind with writing and reading so much today." "To my office until my eyes began to ache." 1667 "I to King's Playhouse till my being so bad since last night's straining of them (eyes) that I am hardly able to see, besides the pain of them." " . . . to bed my eyes being bad again and by this means the nights now-a-days do become longer than I can sleep out." In the same month he records "To Turlington the great spectacle maker for advice, who dissuades me from using 'old spectacles' and do tell me that nothing can be wrong with my eyes more than for me to use reading glasses which magnify much."

June twenty-third, 1668 "To Dr. Turberville's, there did receive some directions for some physic and also a glass of something to drop in my eyes . . . he do give me hopes that I may do well . . . I am not able to read a small letter." July, 1668, "My eyes past use almost, I am mighty hot upon trying the late printed experiment of paper tubes." Later "Wrote a letter to Broad by the help of a tube." Later "Was dictating all correspondence." 1669. "I find it almost certain that stronge drink do make my eyes very sore" and "It is with great trouble that I now see a play, the light of the candles being very troublesome to me."

May, 1669 "The King expressed a great sense of my misfortune in my eyes." Pepys was led to his majesty by the Duke of York. He was ordered to rest his eyes that season.

"Next day at the office, comes hither Lead (optician) with my vizard (a facial mask) with a tube fastened within for both my eyes which with the help, he prompts me to and a glass in the tube do content me much."

At the close of his diary he makes a pathetic entry which was not to be fulfilled "and so I betake myself to that course which is to almost to see myself into my grave: for which all the discomfort which will accompany my being blind, the good God prepare me." Sir G. D'Arcy considers that Pepys suffered from ametropia with presbyopia. This latter was certainly a premature appearance. James thinks that "it is far more likely that much of his trouble was due to error in muscle balance, possible insufficiency of convergence. The spectacle maker would hardly have persuaded Pepys from 'old spectacles' the high plus spherical, if there had been a high hypermetropic error. Glare was a factor, hence the green spectacles.

"The fact that he got relief some uniocular vision through a tube is much in favor of his defect being concerned with binocular vision. I hazard the guess that he would have been made comfortable with a low sphero-cylindrical lens combined with prisms in, and suitably tinted."

It is not apparent that Turberville helped him much if any. If James is correct in his surmise it is not likely that any oculist could have helped much until the early part of the nineteenth century when cylinders were invented and when prisms came into use.

[Douzelli: Teatro Farmaceutice, 1677.]

MEDICAL TERMINOLOGY

By EDMUND ANDREWS, M.D.

CHICAGO

> Oh! Fever, Thou Shalt Not Escape Me,
> I Know Thy Name.
>
> —Atharva Veda.

INTRODUCTORY

THE study of medical English from the standpoint of the philologist is nearly a virgin field. Unfortunately the age in which many scientists were competent classical scholars passed away at a period just before the student of language had brought his studies to a point where philology might be dignified with the name of a science. A few abortive attempts have been made to bridge the gap, but with the notable exception of the lexicographer, the efforts have been so misdirected and scattered that it can hardly be said that a science of medical philology exists.

The medical historian has rarely drawn from his fund of knowledge to enlighten us as to the history of words. His attentions are confined to the history of men and of ideas and he is inclined to forget that careful examination of the names of the men and of the words used to express the ideas may often throw a flood of light upon obscure problems. Even the lexicographer has done but little. He has for the most part been a pioneer and has cultivated the more important branches of his art, and either ignored etymology entirely or based his derivations on guesswork. The New Oxford Dictionary is a conspicuous exception to this rule. Let these remarks not be construed as a slur upon our medical lexicographers as few realize the enormous amount of labor often necessary to trace accurately the history of even a single word.

However, it is a fact that the subject has rarely been touched upon, and is for the most part veiled in the darkest ignorance. On the one side is the student of language who derives "hemiplegia" from Greek "haima," blood, and "plegia," stroke. Such a ridiculous mistake could never have been made by a doctor who was also familiar with "monoplegia," "diplegia," and "paraplegia." "Hemi," half is, of course, the correct word. Another type of error is that made recently by one of the leaders of medical thought who preferred the good old Saxon word "egg" to the pedantic Latin "ovum." That may be a fine thought, but, as a matter of fact, "egg" is not a Saxon word at all. It is Norse. The Anglo-Saxon was "ei," plural "eier," exactly as in German. It may still be heard in rural Kent, and obviously could not have given rise to "egg."

A third sort of error is one made by an eminent lexicographer. "Anastomosis" is stated to have been built up of Greek "ana," across, and "stoma," mouth, hence an opening from one channel into another, but unfortunately for this derivation, in the earliest use of the word, it meant simply "hemorrhage," or more particularly "oozing of blood," what we would call "capillary hemorrhage." It was used in this sense for centuries before it acquired its present meaning. Evidently the lexicographer was wrong. Historically it can be shown that the word became obsolete and was revived later in the form of "synanastomosis" (syn, with) with its present meaning and was subsequently shortened to its present form, as its old meaning had been forgotten and no confusion could occur. The now almost obsolete "inosculation" is the same word in Latin dress.

Such mistakes often give rise to a long chain of errors. "Testis" in Greek is "orchis," genitive "orchikos." The word is so similar to a derivative of the same stem meaning "a flower," that they have been confused and the confusion persists in the word "orchidectomy." "Orchitis" is etymologically correct, but "orchiectomy" or "orchicectomy," although they have often been suggested, are found only in dictionaries. Worse yet, a scholarly botanist of medieval England was led to call orchids "ballockworts." The peculiar shape of the root tubers of the plant is the real cause of these learned absurdities.

Without further multiplying such examples, I believe it is clear that there is a profitable as well as an interesting field of study open to us. The following pages cannot be considered as any more than an outline of the subject, and may I hope serve as a stimulant to further investigations.

ORIGINS

One of the first thoughts of primitive man must have been for the care of his body. To those theologians who insist that tertiary brute man began to cultivate spiritual health before bodily health, I make no answer. Until recently medicine has been the handmaid of religion, but in earlier times it must have been the mother of religion. Long before man began to pray to get well he must have tried to get well and medicine begins there.

In Egypt and Babylonia, history can be carried back far beyond the horizon of any Aryan speaking people, and at the dawn of history medicine is already an established fact. However much our science is indebted to these peoples, its vocabulary is overwhelmingly Aryan. Only a few scraps of the languages of these early Mediterranean peoples were adopted by the incoming Greeks and persist in our medical terminology. These included many Greek letter names such as "alpha," Hebrew "aleph," ox, or "beta," Hebrew "beth," house. The word "chlamys," as in "chlamydozoa" and other compounds is the Phoenician term for "cloak" adopted by the Greeks. Aphrodite came into the Greek pantheon from Syria (Astarte, biblical Ashtoreth). Her name survives in the expression "aphrodisiac" and, coupled with that of Hermes in "hermaphrodite." In view of the sexual excesses indulged in at the worship of this goddess, it is interesting to note that Aphrodite (Latin, Venus) was a deity of illicit love and had a significance quite apart from any ideas of marriage. Venus (genitive, Veneris) survives in our word "venereal" and the modern implications correspond with the ancient facts.

One element of the pre-hellenic portions of our vocabulary has recently been brought to light and appears to be of considerable importance. That is the Cretan. We now know that in the Aegean, there flourished, during the second millenium before Christ, a civilization which compared favorably with that of Babylonia or Egypt. This culture had its headquarters in Crete. The first barbarous Aryans, the Achaeans, wrecked it after two centuries of profiting from its science and learning. During the twelfth century B.C. it was totally destroyed by the Dorian invasion. Five hundred years of darkness ensued, a veritable Dark Age, and not until the time of Pericles was the lost ground regained. It is now clear, that much in Greek art, science and religion, must be referred to these Minoan Sources.

The languages of these peoples have not yet been deciphered although whole libraries and archives are extant and much progress is being made. Indirect methods, however, have given us a list of about one hundred and twenty words. While this list can only be said to be tentative (several may be from Semitic sources), all indubitably found their way into Greek through Cretan channels. One cannot but be astonished on examination of this list to note that over forty are quite familiar to doctors. A number are used in their original meanings as "elaion" oil; "chalkos," copper; "molybdos," lead; "sideros," iron; "chrysos," gold. The non-Aryan origin of the word for iron is especially surprising as the use of this metal has often been supposed to have been introduced by the invading Greeks.

Other Cretan words appear in medicine with derived meanings as: "syrinx," flute; "salpynx," trumpet; "xiphos," sword, and "bothrios," bunch of grapes. Finally these lists may be supplemented by a surprising number of names of plants some of which were undoubtedly used as drugs in very early times. "Mintha," mint; "Coalmintha," calamint; "terebinthos," turpentine; "rodon," rose; "sykon," fig; "hyssopos," hyssop, and numerous others fall into this category. Several drugs are mentioned in old Egyptian pharmacopeias as being used by Cretan physicians.

The clinics often held in connection with the Asklepian temples, among which was that at Cos which furnished Hippocrates with his material, are without doubt of very early origin. It is indeed more than likely that Hippocratic doctrines were in reality a revival of a science buried for seven-hundred years, as this worship precedes the Greeks in the Aegean.

However, our language is predominantly Aryan and a glance at its earliest forms will enable us to reconstruct a bit of very primitive reasoning. A glance at an early Sanskrit treatise on anatomy written about 600 B.C. reveals numerous terms of which the following will serve as examples.

nasa	nose
mula	jaw (vide "mylohyoid")
janu	knee (vide Latin "genu")
manika	wrist

These terms show by their very multiplicity that a definite anatomical nomenclature existed before the dispersion of the Indo-European peoples, as no such extensive intercourse with Mediterranean lands existed as to make interchange of so many terms possible. Ethnology tells us that this dispersal occurred not later than 2000 B.C. Much more surprising is it to find the patella and the olecranon described as "kapala" bones. "Kapala" means "pan" in Sanskrit, as "patella" does in Latin. The implication of a knowledge of the serial homologies of the arm and leg as a heritage of the period before the dissemination of the Aryan peoples is unmistakable. Even at that early date the study of anatomy had begun.

Before leaving this early period, two Greek terms deserve attention. The xyphoid is surely not aptly named according to our conceptions of a sword (Greek, "xiphos"). It meant little until archeologists began to dig up the weapons of the earliest Achaean invaders of Greece, the first wave of rude semi-civilized Aryans destined to flood the cultured Mediterranean world. Their short daggerlike swords were simply copies in bronze of the earlier polished stone daggers and very closely resembled the xyphoid.

The word "thyroid," "shield-like," tells a similar story. This gland does not bear the slightest resemblance to any Greek shields. Recently excavators at Cnossus and Mycenae have unearthed vases on which are drawn solid ranks of Minoan troops protected by shields reaching from the neck to the ankles with a deep notch at the top for the head. This explains not only the word "thyroid," but also why the invaders called these shields "thura" "doors," a word cognate with the German "Thür."

Thus quite a respectable antiquity must be assigned to these terms and one cannot help a feeling of surprise at the discovery of a rather technical knowledge in a primitive people. The above mentioned use of "pan" as an early name for the knee-cap probably also refers to a period when a flat rough disc of burned clay was the precursor of the more elaborate frying-pan. Unquestionably further studies along these lines would yield rational explanations of many other seeming misnomers in our descriptive terminology. It is characteristic of our modern arrogance that we assume our predecessors to have been such utter fools that they named parts of the body after objects which they did not in the least resemble. Similarly the word "typhlon" (caecum, blind), would imply that the early knowledge of anatomy was derived from lower animals. The human caecum is not enough of a blind pocket to deserve this title, but in many animals the long pouch might well be described as blind.

Passing from these vague shadows, it is to Alexandria that we must look for the first firm ground on which to base our studies. Here, a little over three hundred years before Christ was founded the greatest university of ancient times. Under the princely patronage of the long line of Ptolemies, this school soon became preeminent. The lively spirit of research manifested by the first generation of professors hardly outlived them, but as an institution of learning the school maintained an almost unrivalled supremacy for over one thousand years. The names of these rulers of Alexandria have become a strangely familiar sound to us. Those of Ptolemy Soter (Saviour) and Ptolemy Epiphanes betray their influence on subsequent religious thought. The great city of Philadelphia translates its name as "brotherly love." To the third Ptolemy the significance was quite otherwise. The rude Macedonian soldiery that supported his throne grumbled considerably when he followed the Egyptian royal custom of marrying his sister, and he passed on to posterity branded with the opprobrious epithet "Philadelphos," "sister-loving." The last of this line was Cleopatra and to her we are indebted for a small treatise on medical gynecology. The following prescription for ulcers of the vulva makes a rather bulky suppository, and probably represented personal experience:

Arsenic
Elaterium
Sulphur
Lathyris aa gm. 6.6

She also wrote a book on cosmetics. Although the identity of the author of this book with Queen Cleopatra has been doubted by some there is ample parallel for such procedures. Mithradates of Pontus wrote on medicine, as did Caesar Augustus who was said to have invented a new eye lotion. Dyonysus, tyrant of Syracuse was even said to have performed surgical operations. Royalty was not above dabbling in medicine.

In this great university was collected all the medical knowledge of the ancient world. Its greatest feat was the gathering together and codification of a vast amount of scattered material. Much of this was already Greek, but the remainder was translated into Greek. Many ancient authorities, even some of the greatest, antedated the foundation of this school, but their efforts were single and uncoordinated and in the halls of Alexandria our medical language received a stamp of scientific exactitude which is still evident after twenty-two hundred years.

Its development is a strange story. Unlike the normal growth of tongues we follow the development of a science, not of a people. The inevitable dialectic decay suffers a curious check. It is a language spoken only by the scholar, and his ingrained respect for antiquity combats constantly the changes which occur in speech from generation to generation. Ordinary speech is controlled from below. The masses make and remake it in defiance of scholars. Here however the written word rules the spoken word and regular regeneration of older changing words occurs. Degenerated forms of scientific terms often show what happens when a word escapes the protection of the scientist and follows the usual trend of popular speech. "Frenzy" retains but a faint resemblance to its parent "phrenitis." "Palsy" bears the same relation to "paralysis." Such doubles abound and in most cases it can be shown that in the passage through the French, the worst mutilation occurred. They are not the only sinners however, in Roman times similar clippings occurred when the masses used scientific words. "Maxilla" shrivelled into "mala," "taxillus" into "talus," and in the former case, both terms persist in medicine with slightly different meanings.

As the beacon of learning passed from Greece to Rome and from Rome to the medieval centers and thence into English, many changes appeared. New words were brought in from Arabic, the Celtic and Teutonic languages; old ones changed their forms or their meanings. Certain combinations of sounds are impossible to the speakers of other tongues. Initial "phth," "tl," or "kt" for example are foreign to our tongue, and necessitate compromise. In other cases fanciful or descriptive names were literally translated from one language to another, after all ideas of their original meanings had been lost. These practices can best be elucidated by a consideration in turn of each language to which our medical English is indebted for its almost inexhaustible vocabulary.

GREEK

One is tempted to begin any discussion of medical Greek with some mention of Asklepios as the father of Greek medicine. He is mentioned by Homer and had two sons who were surgeons in the army before Troy. His father was Apollo and he was killed by Zeus who feared that his medical skill was so great that he would be able to make all men immortal. Etymology, however, compels us to class him as mythical, as his name bears too great a resemblance to the word "asklapas," "lizard" or "snake," stressing the element of serpent veneration so prominent in the worship of Apollo. Asklepios himself is generally pictured carrying a wand entwined with serpents, and the myth traces back into Cretan times, judging by the numerous statuettes of goddesses carrying serpents. Our caduceous, of course, has this origin. At any rate Asklepios has the distinction of being the first Greek name to be butchered, into Aesculapius.

To Hippocrates we are indebted for the sudden appearance of an extended scientific vocabulary in full bloom. He had literally no predecessors who set a pen to paper. A professor at the great school on the island of Cos, he gathered the learning of that school together in a great series of treatises on various subjects. The language of his works is Ionic Greek, a dialect so closely akin to the Attic that it is difficult to draw the line between the two. There was enough distinction to Athenian ears, however, to make it worthwhile on their stage to have physicians speak with an Ionic accent just as actors lapsed into Doric in reciting lyric poetry. His authority was so great that as long as Greek culture lasted it was the fashion to scatter a few Ionic terms into medical writings.

As Hippocrates had no predecessors it might almost be said that he had no successors, at least for a period of about one hundred years. Aristotle in his works on biology follows him so closely as to be almost a plagiarist. The latter had a medical education himself, being of the Asklepidae, the family of hereditary priests of Asklepios. He was the tutor of Alexander the Great, in his fathers court and when he helped to establish the Greek tongue as the official language of the vast Macedonian empire, it was in the Attic dialect, and in this form was the language of the Alexandrine school.

About one hundred years, later, when the great Herophilus was called from Cos to Alexandria as its first medical professor, he collected (perhaps for the first time) the scattered works of Hippocrates, and endeavored to modernize them not only in spirit but in language. This was a considerable undertaking as language in those days changed much faster than it does today, with the stabilizing influence of the printing press. Even today in my edition of Hippocrates, about one hundred years old, I find in the English notes such words as "alvine," "cataplasm," "tormina," and "deliquoia," and many others equally strange to our ears. Herophilus' task was of greater difficulty due to the fact that the language of his authority was exceedingly condensed and difficult to elucidate. It is possible that what we have of Hippocrates is considerably tinged with Herophilus. At any rate it was the writings of the latter and his famous colleague Erasistratus, that set the fashion for the entire ancient world, and to a lesser extent for the modern world. Nearly three quarters of our medical terms are of Greek derivation.

It is not only the actual preponderance of Greek words that impresses us, the spirit of the language is Greek. Newly coined words are constantly made from the Greek as well as the number of suffixes and particles which have come into common English use. "Autos," "self," is so well naturalized that it is used freely not only with Greek words, but with Latin ones as well, as in "autoclave," "autoingestion," etc. This practice has been condemned by purists as an unscientific way to build up words, but many such are too firmly set in our language to hope to ever displace them. The word "automobile" has set a very bad example. Besides the practice is too old. The Romans themselves often used "auto" in compounds. Their own "se," self, was not available as it got confused with "se" a prefix meaning "apart," as in "seclude" and "segregate." "Sui" an oblique form as used in "suicide" is quite rare.

Other endings as "ectomy, otomy" (ek, out; tome, cut) are just as universal. The word ovariotomy violates the language mixing principle but will probably never be gotten rid of. "Rhea" ("reo," flow), is another such suffix with a very general application. "Oma" as a suffix signifies a neoplasm, but in the older usage was applied to a swelling of any sort before tumor pathology was understood. "Hematomas" are not neoplasms. This suffix has no special significance in Greek, such as the others have, and was used empirically in this significance.

"Itis" has a peculiar history. It is simply an archaic form of the adjective ending seen in classic Greek as "ites." It is feminine to agree with a "nosos" understood. Thus "arthritis nosos" meant "joint disease." The "nosos" began to be left off at a very early time. Hippocrates has "arthritis," "nephritis," and "pleuritis" as well as numerous others standing alone. This old Ionic idiom by this means came very early to have much of its present significance. "Ascites" represents the picture as it would have developed in classic Greek. Its history is "ascites nosos," "baglike disease, "with the eventual loss of the "nosos." Note that this ending is an old adjective form not a noun. Hence it is wrong to decline it as many do making the pleural "itides," "ites" is the better form.

This Greek vocabulary comes to us in a singularly unimpaired form, much more so than in most modern tongues. English has few restrictions in its ability to pronounce Greek, and all are at the beginning of words. We are unable to pronounce initial combinations such as "phth," "tl," "chth," "kt," and "ks," otherwise no Greek word presents any difficulty to the English tongue. In some cases the Greek endings are dropped or Anglicised, but the majority remain in their original form. In French for instance, the only final consonants permitted are "c," "f," "l," "r," there is no "th" sound, "s" before consonants is regularly lost (Etomac, stomach) and numerous other such radical difficulties have caused a far greater change in Greek words. Nasalization of many vowels introduces another difficulty. Italian presents similar obstacles and in addition is spelled phonetically, so that even the written word is often unrecognizable in Greek. Only an Italian would recognize "hypophysis" in "ipofisi." German resembles English in this respect, but these terms are treated as foreigners by the German. They are often declined in Greek, or even in Latin, and pedantry has to such an extent interfered with their naturalization that a very complete Teutonic vocabulary of synonyms has grown up. These synonyms are usually literal translations and not in any sense old Teutonic words. When a German says "thyroidea" or "sphenoidea," he is consciously speaking a foreign tongue and knows that the German is "Schilddrüse" and "Keilbein." We, in English, have no other terms. The scientific ones have completely driven the others out. A German can say "milz" for spleen, but the Anglo-saxon "milt" is long obsolete. It is very curious that even "testis" has no English equivalent, at least in polite usage.

In the pronunciation of Greek words it is very difficult to bridge the gap between the living and the dead language. Unfortunately the accent is very generally misplaced. We pronounce them according to Latin rules for accenting. (If the penult is long, accent it; if not, on the antepenult.) This is due to the fact that during certain periods in the Middle Ages, learning was at such a low ebb that even the scholars were ignorant of Greek. Alcuin, the Saxon sage at Charlemagne's court, was said to be the only scholar in his empire capable of translating Greek. Therefore these words come to us in a Latin dress; "k" becomes "c," "ei," "i," initial "x," "z," etc. Certain "c"s incorrectly have followed the French rule of becoming "s" before "e" or "i" as in "cephalic" and "cirrhosis." Aside from these minor points, the passage of this Greek vocabulary through the Latin has brought about but few changes which we would not have made anyway. The same combinations that the Romans fell down on would have floored us. As for the accent, many Greek words were accented on the last syllable, a process very difficult for speakers of English. "Cathetér," "micrón" and such words would never have kept such accents in English. Then again, what would have become of the accent in the vast number in which the ending was stressed? We generally drop the ending. "Ophthalmic" (ophthalmikós), "peristaltic" (peristaltikós), "metric" (metrikós) and such words would be left without any accent.

Let me now speak of a few modern tendencies in this connection. Certain efforts are being made to correct old errors. Most of these consist in one man demanding a change in the spelling or pronunciation of one word. Few succeed. This is fortunate as most are misdirected and inspired at best by only a partial knowledge. "Neurasthenia" has had a strange sound in the mouths of certain neurologists of late. The Greek is "neurasthéneia." If one insists on the pronunciation of Greek words according to Latin rules, he may indeed say "neurasthen-eýe-a." However, let him stick to the principle. Derivatives of Greek "ἄggeîon," let him call "ang-eýe-oneurotic," "ang-eýe-ology," "ang-eýe-ospasm" etc. In this case both Greek and Latin apply. If we are to follow the Greek, "analgesía" and "anemía" (anaimía) are correct.

But the point is that all such corrections are out of place. If one wants to improve language, there are plenty of faults to find. "Trachea" should be "trachia;" "embryo," "embryon"; "adiposus," "adipatus"; "stearic," "steatic"; "calcaneus," "calcaneum" (Vergil); the ductus Botalli was known to Galen; Botal, a Frenchman, also "discovered" the foramen ovale; the anconeus (agkon, elbow) is really the anconeus tertius, the other two parts being the heads of the triceps. The list might be prolonged indefinitely. A philologist can pick flaws in thousands of words. Language is not reasonable. It is not built, it just happens. It is the duty of the philologist to catalogue words, study them, explain them if possible, and to deduce rules of how and why they assumed their present forms. Anything else is pure pedantry.

The very genius of our language is at such utter variance with the Greek that it would be idle to hope for an accurate reproduction of their sounds. Let us carefully examine one word, "anaesthesia" (anaisthesia). The Greek sounds are put in one column and the English in the other:

	Greek	English
a	as in car	as in man
n	same in each	
ai	i in ride	e in let
s	same in each	
th	Much rougher than ours, somewhat as i writhe	

	Greek	English
e	as in let	as ee in reed
s	a true s sound	a z sound
i	ee	a y sound
a	as in car	uh

Of nine sounds, seven vary from the Greek pronunciation. Therefore why quibble over silly details of accent or spelling? We are talking English even if many words are of foreign origin.

Greek words readily fall into two classes, classic and Neo-Hellenisms. The overwhelming majority belong to the latter class of artificial words built up of Greek roots by Roman, medieval or modern scientists. As a rule they come to us in clearer form than the older ones. The classic terms have often undergone extreme degeneration. "Frenzy" (phrenitis), "dropsy" (hydropsis), "palsy" (paralysis), "surgeon" (cheirourgeon), "licorice" (glykorrudzia), "fancy" (phanities), and "chest" (kystos) exemplify this tendency. They represent the age when medical knowledge was so small that every well educated man dabbled in it and carried its terms into the popular speech where they underwent the same decay as nonscientific words did.

Similarly the meanings of these older terms often underwent radical changes. Hippocrates called a carbuncle "anthrax" (coal). The word became obsolete and was resurrected in 312 A.D. to describe an epidemic exanthem, probably smallpox. (Variola was first applied to this disease about 1000 A.D. Previously it had meant simply a rash of any kind. Then it became "the" rash, in the same manner that syphilis became "the" pox.) Again, Hippocrates describes cataract unmistakably, but called it "glaukoma" (glaux, grey). "Hypophysis" was a common term in Greek medicine long before the pituitary was discovered; it also meant cataract. Another term now used only in ophthalmology is "hypopyon." To the Greeks it was a general term for any sort of ulcer. "Brace" seems now to be unconnected with "brachia" (arms). "Melancholy" and "cholera" are remnants of the older humoral pathology, and no longer bear any relation to "chole" (bile).

Strange as it may seem, in ancient Greek learning, modern medical English would recognize many words coined two thousand years after Hippocrates' death, and most of the familiar terms would have so changed their forms as to become unrecognizable, and even if he could place them in their new dress they would have stange meanings.

LATIN

Latin culture emerges from obscurity at a much later period than the Greek. At first we see only a tiny Roman state overshadowed on the north by the powerful Etruscan Empire and on the south by numerous Greek city states. Even the Latin states were sharply divided in language. Other Italic dialects were probably at least as widespread as true Latin, and it is very likely that Rome received its aristocracy from speakers of a Sabine tongue. Such names as Pomponius (Latin, Quintilius, fifth), Vitellius (Latin, Italicus) are Sabine in Form. Even today "pater familias" is a common expression, but the pure Latin would have been "familiae." Derivatives of "bos" "cow" are common in medical usage, but it is also a Sabine form; it would have been "vos" in Latin. Finally the very term "medicus" belongs in this same category.

As these primitive Romans took on more and more Greek culture, they acquired many Hellenic terms. "Nausea" is an example of a borrowing in very early times, and tells us who it was that taught the Romans the art of naval warfare during the Punic Wars.

There is another class of words exemplified by "hepar" liver. The true Latin is "iecur" (vide foie, Fr., fegato, ital., higado, Sp.). "Hepar" however replaced it in ordinary speech long before the importation of Greek medicine. It was brought in by Greek priests and experts in the art of prophesying from sacrifices. They also introduced a few other Greek words, mostly for abdominal organs, as "ilia" "guts." At these rites the priests ate the tenderloin and to the Gods was attributed a mysterious fondness for tripe.

Warfare had its influence. The soldiers of that day were as inveterate gamblers as in our own. When the Greek soldiers "rolled the bones," they used dice made from the body of the second cervical vertebra of the sheep (Gr., astragalos). The Romans made their dice (taxillus, contracted to talus) from horse's heel bones. The terms were thus confused and both are now applied to heel bones.

The language of the Alexandrine School was brought to Rome in the second century B. C., and her physicians were largely Greek until the late Empire. A tremendous share of our medical words are pure Greek from this source. In Rome, eventually all were Latinized, but even so retained their Greek form, only the endings being changed. A word like "chorea" is clearly Greek but is declined in Latin. A few Roman pedants even used Greek case endings. This practice aroused the wrath of Cato and later of Cicero. The popular contempt for Greeks as seen in the contemptuous use of "Graeculus," hastened the process. Thus in the end the change of "-os" to "-us," "-ion" to "-ium" etc., was all that occurred.

The first of these Alexandrine invaders of any prominence was Archagathus who arrived in 220 B.C. He called himself Vulnerarius, "dealing with wounds," but this gaudy title his contemporaries changed to "Carnifex," butcher. His very name, translatable as "superbest," suggests charlatanry, but his success was great and he was the first of a long line whose language almost completely dispelled Latin. About a century later Asklepios put Greek medicine on such a firm basis at Rome that it almost amounted to a monopoly. The Romans at this period probably had but little in the way of scientific vocabulary, certainly none of sufficient authority to preserve their terms from dialectic decay due to popular usage.

Polybius (122 B.C.) said that in his time the Romans could not read the inscription on a monument in the Forum, celebrating Duilius' naval victory over the Carthaginians (260 B.C.), so rapidly does decay take place. During this time we can see "mala" replace "maxilla," "tela," "texilla," "velum," "vexillum," "ala," "axilla" etc. In many cases both forms survive with closely related meanings.

As Latin words began to creep into medical language, a curious phenomenon is observed, the translation of the fanciful word used to express a concrete idea. Allow me to elaborate. When Alexandrine grammarians conceived the idea of classification of word forms as "cases," they applied the word "ptosis," meaning a "fall." Romans therefore followed this lead and said "casus," also meaning a "fall." The modern German continues the tradition with "ein Fall." Similarly when a medico translated Greek into Latin, he did not use the Latin word for the object. This was frequently obsolete, vulgar or perhaps never existed. Therefore he translated the concept used to express the object. For example, the small leg bone was called "peronaeus" in Greek, meaning a "pin" or "breast-pin," in Latin they called it "fibula," also a common term for "pin." Doubles of this sort abound and may be aptly compared to such modern German monstrosities as "Keilbein," skiff-bone, from Greek "sphenoid," skiff-like, or "Schilddrüse," thyroid which means shieldlike in Greek. The process has continued into modern times as exemplified in "bacteria" and "bacillus," meaning "rod" in Greek and Latin respectively. This process must be sharply distinguished from such fundamental similarities as are discussed in Chapter 1.

It is not only objects but concepts that illustrated this trait. Greek, "phlogosis," Latin "inflammatio" and German "Entzündung" make a trio whose meaning only history could unravel. All mean exactly the same, not only literally but figuratively. Do they represent parallel cases of evolution or were they copied from one another. "Eczema" (ekzein), to boil out, on the other hand evolved independently in a parallel manner. Let us add some terms for psychic ills. "Anxious" "anguish," "anxiety," Latin "angustus," German "Angst" etc. make up a group whose meaning is founded on a figurative meaning of "narrowed" "straitened." The Gaelic "angadh" however means inflammation. It is an independent development and cannot be derived from the Latin as no such form as "angatus" existed in Latin.

Soon the Greek vocabulary was so well naturalized that adjectives were derived from Greek nouns by Latin methods. Thus "hepatarius" instead of "hepaticus" appears at a very early date. "Aneurysmal," "dermal," "hemal" instead of more correct "aneurismic," "dermic" and "hemic" represent a tendency continued into modern times in the production of such words as "bacterial." We say "hypodermic," but "dermal" is too firmly seated to dislodge. The use of adjective forms in "ia" followed the Greek "itis" to a certain extent. Thus, "pneumonia" equals "pneumonitis." "Nephria" and many others have given way to "itis" forms, and since modern bacteriology has given us accurate methods of distinguishing inflammatory from noninflammatory lesions, the Latin "ia" as well as the Greek "osis" are being confined to the latter class.

Under the influence of these Greek adjective endings, with special meanings implied, has grown up one of the worst features of our vocabulary. "Itis" and "osis," not to mention the syllables "rrhagia" "rrhea, "algia," etc., being Greek, seem in most cases to demand Greek nouns to modify. In a tremendous number of cases our anatomical terms are Latin, and the result is that the Greek equivalents were resurrected, and a double set of terms result. "Appendicitis" has eclipsed "typhlitis," but this is the exception. The following list gives us an idea of the unnecessary labor we have inflicted on all beginners in medicine.

Organ	Lesion	English
mamma	mastitis	breast
ren	nephritis	kidney
medulla	myelitis	marrow
musculus	myositis	muscle
uterus	metritis	uterus
vesica urinaria	cystitis	bladder
vesica fellea	cholecystitis	gall bladder
umbilicus	omphalitis	navel
cutis	dermatitis	skin
glandula	adenitis	gland
pelvis (renis)	pyelitis	pelvis
stomachus	gastritis	stomach

It will be noted that the Latin is almost invariably the more familiar term and generally approaches nearest to our own. Why must we use a different language in order to express morbid conditions? Surely the student has enough to contend with without having such a double set of names drilled into him.

Words often leave traces of ancient scientific errors. "Pituitary," cognate with Greek "ptyalon" and English "spit," brings us back to the time when it was thought that the nasal mucus was secreted by the hypophysis. Many Greek errors are thus prepetuated in Latin. "Arteria" recalls the fact that arteries were supposed to contain air ("aerterion," air duct). This concept arose in ancient Egypt and appears in the Ebers

Papyrus. "Aponeurosis" in the same manner has persisted in spite of the correction of the Hippocratic confusion of nerves and tendons. "Crystal" is derived from the past participle of the Greek "krýein," to freeze. We now understand the difference between frozen and crystallized, but the term is here to stay in spite of new words being formed from the same stem such as "cryoscopy."

Light may also be shed on non-medical aspects of history by these studies. It is known that Judaism and other Eastern sects in which circumcision was practiced, were strong competitors with Christianity in Rome for several centuries. Many new converts seem to have regretted the loss of the prepuce and rued the "unseemly exposure of the glans in the Baths." Numerous statues testify to the pride of the Roman in his sexual organs. Surgery responded to the need and an operation "ad tegendam glandem" (for covering the glans) in these cases was devised. Celsus speaks of it as a common proceedure in the early Christian period, as "exposure of the glans in public is not consistent with dignity." Five centuries later, when the circumcising sects had been pretty well conquered by Christianity, Paul of Aegina says that it is rarely done. The operation consisted in making a circular incision around the root of the penis, drawing the skin down over the glans and holding it by a ligature or sutures until the denuded collar about the penis was granulated across.

In this connection it is interesting to note that the Latin "glans," as well as the German "Eichhorn" are but translations of the earlier Greek "balanos" meaning an "acorn." From this it is a logical deduction that circumcision must have been a very widespread practice among the early Mediterranean peoples, as no uncircumcised race would ever liken the head of the penis to an acorn. Historically we know that not only among the Jews, but also in many other Syrian and Egyptian sects flourishing in Rome early in our era, circumcision was obligatory.

Considering everything, the Romans added but little to science; they merely helped to preserve Greek learning. They were mighty builders, organizers and rulers, not thinkers, in the scientific sense. Research was unknown to them. Nature was to be made use of, but few ever sought to search out her secrets. Cato hated doctors and wrote a sort of "Home Medicine Book," whose uncritical puerilities reflect the spirit of his race. He said that Rome could get along "with medicine but without doctors." It could also have survived the loss of his curative charms and incantations. It is but natural that such a people should only have adopted and translated Greek medicine. A race that calculates with pebbles (calculi) cannot advance far in science.

ARABIC

During the Middle Ages, while learning was at a low ebb in Christendom, science flourished in the Moslem world. The calumny that the Alexandrine library was sacrificed to Mohammedan fanaticism is only half true. Julius Caesar burned it to make room for his cavalry to maneouvre in a street battle. Mark Antony, a few years later, robbed the rival University of Pergamum of its library to make good the loss. In 390, a Christian bishop, Theophilus, destroyed it for reasons worthy of William Jennings Bryan. It contained too much pagan philosophy and science to please his fundamentalist heart. There could not have been much left when the city was stormed by the Arabs in 682. One can scarcely blame the ignorant desert Arab for following the example of the Christian bishop and pronouncing the celebrated dictum: "If their contents agree with what is written in the Word of God, the books are of no use to us, the Holy Writ being sufficient for our guidance; but if they are at variance with God's Word, then surely they should be destroyed." They are said to have furnished fuel to heat the public baths for six months. Amru, Omar's general, set this precedent, but the genius of the race was too great to allow them to follow it for long.

Almansur, Caliph of Bagdad, a hundred years later reversed this policy and gathered about him Greek scholars in all branches of learning to collect the wisdom of the ancients which had nearly perished. Medicine received its share of attention and years were spent in the search for lost works of the Greek writers. The early students, whose principal function was the translation of this material into Arabic, were frequently non-Moslem. Greeks, Persians and Jews predominated. This tendency was so marked that there was an old saying that the way to find a "Moslem" surgeon was to look for one who wore Christian clothes and spoke with a Persian accent. The Caliphate of Cordova was soon a close competitor of its eastern sister in the development of science. When the Arab Power collapsed in the thirteenth century, this science was destroyed in toto, but in the meantime a goodly share of it had been transmitted to the slowly awakening Europe. It left us the priceless heritage of the Arabic numerals, the decimal system of notation by the use of ciphers.

In the early stages of the growth of Islam it must be remembered that its devotees were utterly uncultured Bedouins. The lands they overran were among the most advanced in the world and their culture was adopted to a large extent as soon as the first wild surge of conquest was over. Arabic terminology is flooded with Greek words, and to a lesser extent in scientific sections with Persian ones. Not only that, but the names given to many objects and ideas are often translations of Greek concepts, Arabic, being a Semitic tongue built on an utterly different foundation. The adoption of Greek sounds was only accomplished after such extensive changes as to render them almost unrecognizable. There are many amulets extant, dedicated to the god "Bukrat," beseeching relief from various bodily ills. These take on a new significance in our eyes when we learn that "Bukrat" was as near as they could come to the pronunciation of Hippocrates. Similarly Plato was transformed into "Iflatun."

We have a number of words of Greek origin which are known to us only through Arabic. "Chemistry," "alchemy" etc. are derived eventually from the Greek "chumos." This word has been resurrected in modern Neo-Greek as "chyme." The "al," "the" is thus prefixed to numerous Arabic words. "Alembic" also can be traced back to the Greek, "al," plus the Greek "ambix," "bowl." "Elixir," in Arabic, "al iksir," is from the Greek "xerion," a dusting powder.

This Moslem culture was a widespread one. Its scientists were far travelled cosmopolites. Avicenna, for instance, seriously considered an invitation to study in India. Another, Al Biruni, did go and translated much Indian medical lore into his own tongue. Thus was accumulated a vocabulary replete with terms borrowed from distant fields. "Sugar" comes to us in Arabic form, but they got it from India. "Sakkara" is the Sanskrit form and modern science has again restored it to light in that shape to define a substance of excessive sweetness. "Tartar," the Arabs borrowed from the Persian, "Durd," dregs, sediment, especially of wine, was its ancestor. This word has a less respectable cognate form in our own language, "dirt." "Borax" is also a Persian loan word through the Arabic.

Of the pure Semitic forms one could name a long list. It is remarkable what a high percentage of our rather scanty Arabic words are scientific, but it is a reflection of the relative degrees of culture of the two races during the Middle Ages. For centuries, there was a stream of Moslem physicians as well as acrobats, jugglers and mountebanks of all sorts itinerant in Europe. The medicos were as a rule held in higher repute than their Christian confreres. Even the Pope did not disdain to have Arab doctors in his train. Through such sources we are indebted for the preservation of much classical learning as well as the introduction of numerous words into our medical language. "Cipher" is Arabic "cifr," meaning empty; "senna" is Arabic "sana"; "nitre," "nitric" etc., from "nitrun"; "myrrh," from "murr." "Magazine," Arabic "makhzan," means a storehouse. "Coffee," a Semitic term, reaches us through the Turkish "kahveh," and scientists have restored it to nearer its original sound in the form "caffe-in." "Amber," Arabic, "çanber," although it appears in medieval Latin and Greek, betrays its Arabic descent in the old Norman French form, "lamber," with the prefixed article.

Some seemingly classical words, if analysed show the extent of this influence. "Ligamentum nuchae" is known only in this Latin form. It is, however, derived from the Arabic "nuq'rah," spine. "Algebra" is ordinarily not looked upon as a medical word at all, but to the Arab, it meant not only the science of figures, but a redintegration or setting of bones as well. It still retains that meaning in modern Spanish, and occurs frequently in medieval medical works in English.

"Alkali" (kali, ashes), as our word potash and potassium, its Neo-Latin form, teaches us how old alchemists first discovered hydroxides. "Alcohol" has a peculiar history. "Kohl" in its earliest sense was applied to certain cosmetic face powders. It was at times translated "antimony." Later it was confined to the purest of these, and its use spread in the sense of "purified," "triturate," and finally acquired its present significance when alcohol was first produced by the repeated distillation of fermented mixtures.

The ignorance of Arabic by some early translators lead to some absurd mistakes. The cephalic and basilic veins are the products of mistranslations. The former often runs across the shoulder and empties into the jugular and was therefore supposed to be a good place to let blood in diseases of the head (cephalos), and this became a dictum in medieval medicine. The basilic was the royal vein and was the proper place for venesection of the king (basileus). As a matter of fact the two terms meant simply "inner" and "outer" in Arabic (kifal and basilik), and refer to the position of the veins on the arm. Again one looks in vain for the origin of such terms as dura mater or Adam's apple in the classical languages. They are but literal translations of fanciful Arab concepts for which the translator could find no Latin equivalent.

FRENCH

By the end of the sixth century the dialects of Latin spoken colloquially in Gaul, Spain, Italy etc. had become mutually unintelligible although for three centuries longer, Latin continued as the only vehicle of written thought. In scientific affairs the use of classical Latin continued almost to our own times and most of its vocabulary is thus preserved intact. However, popular usage worked great changes. As a large majority of our learning came to us through French channels, a short review of these influences is necessary.

One must recognize clearly to begin with that the Romance languages did not evolve from the Latin we learn in school. We must look to the speech of the people, the Lingua Romana Rustica, not the Lingua Latina. This "Romance" (Romana) throughout classical times varied sharply from the cultivated speech, and in most cases where they differed, French followed the vulgar tongue. Other older Italic dialects (as Sabine), slang, Teutonisms, and Celticisms are all freely represented. For example, the French for head is "tête." This clearly is not derived from "caput." It comes from "testis," "a pot," a slang term very modern in appearance. Similarly German "Kopf" is from Latin "cupa" a pot, and Norse "bollr" is from "kolla," pot. The fashion of calling a head, a pot, was therefore quite widespread. It is as if in modern English, "bean" or "dome" were to supersede "head." In this connection I might remark that in the absence of any direct proof it is absurd to derive "testicle" from the word for "witness."

Language does not grow by any such philosophic concepts. "Little pots," "potties" is a far more rational assumption. "Caput" as an anatomical term is extant in the Norman-French "cap-a-pie," "head to foot." In modern French it appears as "chef" with only a metaphorical suggestion of the head.

In the same manner "crus, cruris" was superseded by a vulgar form which appears in modern French as "jamb." It was probably a borrowing from the Celtic "camba," a crook, also "knee." This must have been a very early slang use as the Germanic Languages show an exact parallel in such words as "ham" also derived from an early word for "crook."

"Focus," "hearth" thus displaced "ignis," the general term for fire (French, feu, Italian, fuoco, Spanish, fuego). In modern times it was resurrected by Kepler who used it quite aptly to describe the "burning point" of a lens. "Bouche," "mouth" from Latin "bucca" cheeks suggests the growth of such modern expressions as "to feed one's face."

The Norman patois brought to England by William the Conqueror was considerably different from what subsequently developed into French. Even today the Parisian dialect is spoken by less than one-half of the people, after having been the official language of the nation since the decree of Francis I in 1539. The Norman influence in England soon gave way to the more important language of central France, but nevertheless it left us a few words. Thus, "catch" is the Norman form of "chase" in the Parisian dialect, both from Latin "capto." Most of these terms however rapidly became obsolete, although some medical ones found their way into Late Saxon works. "Surgeon" thus appears in its Norman form, quite distinct from the French "chirurgein." Others acquired special meanings as "trump" for "triumph" in card playing.

It is often possible to tell from the form a word takes in English whether it is an old or a recent importation from the French. "Oleum" appears as "olie" in old French and "huile" in the modern form. It is clear that our "oil" is derived from the modern form. Conversely, "corpus" in Latin gave "corps" in old French which the moderns have further shortened to "cors." Our "corpse," therefore was borrowed before the "p" was lost.

It was during the course of this passage through the French that the worst mutilation of our classical terms took place. Latin, on the whole, treated them with respect as did English subsequent to its emancipation from the French. The incurable laziness of the Gallic tongue soon made most of them unrecognizable, and they come to us but mutilated fragments. "Jaundice" represents a Latin "galbanissum," "yellowness," but has so far lost all resemblance to its progenitor that even old medical works speak of "yellow jaundice." The Gallic aversion to the initial "s" followed by a mute produced "etomac" and "epine" (stomachus and "spina"), but these fortunately, with hundreds of others were dropped or restored after a temporary residence in Old English. "Palsy" and "frenzy" (paralysis and phrenitis) give an idea of what ignorance may do to old terms, but perhaps the best example is a non-medical one. A man named Kummer manufactured clay pipes, "pipes de Kummer." This, in the spoken tongue was interpreted as "d'ecume de mer," scum of the sea, and found its way into German as "Meerschaum," and today any tobacconist will solemnly assert that these pipes are made of sea-foam.

Our real debt to the French is the introduction of numerous fine nuances of meaning. The richness of the language has caused us to borrow numerous words to fill gaps in our own. "Esprit," for instance, varies a shade from our "spirit," so that we are adopting it as our own. "Adroit," literally right handed, filled a want centuries ago. Recently, the opposite "gauche" has begun to feel its way across the channel. Many recent French words, as "bougie," "fourchette," and "malaise" still appear foreign to us. "Malady," "plague," and "bistoury" have made slight orthographic changes, and have less of the alien stamp. All the older ones as "powder" and "mask" are now fully at home in English and bear no traces of their foreign origin.

Some words are brought because of silly avoidance of blunt mention of certain forbidden subjects. "Mal-de-mer" thus furnishes prudes with a "nice" word for seasickness, not only with us but to the Germans as well. Strange as it may seem "piss" falls into this class. The Latin "mingere" utterly disappeared, although "mingent" appears in Old English medical works. "Piss," although it has no parallel in classical Latin, is found in all the Romance languages. It was adopted into other tongues as a euphemism and in early German was used by women and children at first as a "nice" way to express themselves. In early English, it was the standard word for urinate in medical text-books. In Elizabethan times it was respectable enough to allow the inclusion of the following in a book of proverbs: "Money makes the pot boil, though the devil piss in the fire."

"Cretin" has a peculiar history. In medieval France the spineless effeminacy of many ultrareligious souls made the term "Chretien" (Christian) one of contempt. "Cretin" thus came to be applied to any stupid fellow and finally to the sufferer from congenital hypothyroidism. A close parallel is "benêt," "beni," a simpleton . . . benedictus. No more illuminating examples could be found of the buoyant independence of French thought and the genius which gave us much of the wealth and precision of our scientific vocabulary. One cannot quarrel with the inventors of the metric system, even though they did say "kilometer," instead of "kiliometer" (Greek, "chilioi" thousand). The richness and flexibility of English, which as we shall see in the next chapter is largely due to French elements, is ample compensation for the maltreatment of a few musty old medical terms.

ENGLISH

Anglo-Saxon, as we first see it after the Saxon conquest of Britain in the fifth and sixth centuries, is the language of a rude uncultured race whose learning is peculiarly their own. But little classical learning had penetrated the German forests to the Frisian and Danish shores and as a consequence the medical vocabulary, limited though it was, consisted solely of Teutonic words. From this source are derived many of the simpler terms for parts of the body, as arm, hand, foot, knee, etc., but strange to say, even this list is rather limited; spue, bosom and mouth may be added. Gums, Anglo-Saxon "goma" was even then plural. For the most part, however, these old terms are lost and while the German maintains a much larger share of pure Teutonic words, the majority of ours have been displaced and forgotten. Thus we can no longer say "milt" as a variant of "spleen," although in German "Milz" is still available. Many Anglo-Saxon terms are now applied only to animals. Veterinary medicine is full of them. "Snaffle" an old term for mouth, is now applied to a kind of bit. In such ways and in slang we can see a faint shadow of a lost vocabulary.

When the Saxons arrived in England they found a flourishing Roman civilization. The Celtic Britons throughout the more settled portions spoke Latin and regarded themselves as Romans; many, in fact, possessed Roman citizenship. The invaders were in such a low stage of culture that they did not even occupy the towns and villas from which they drove the inhabitants, but called them "Cold Harbors" and left them deserted. It is not surprising therefore that they acquired but little of their language. Slightly later a few Latin words began to creep in, largely under clerical influence. "Fever" (febris), plaster (emplastron), poppy (poppeia), organ (organon) and balsam (balsamum) are among these very early borrowings. Some have very long histories as "hemp," Anglo-Saxon "henep," Latin "cannabis" Greek "kannabis," Sanskrit "canna." It is evident that the Saxons treated their Latin words more kindly on the whole than their Frankish brethren did. Some, however, did not get off so easily. "Crutch" appears as "crycc" in Saxon, a middle stage in its development from "crucea." "Cheat" (Greek kustos) departs farther from its model. The modern form "cyst" is not much nearer. "Canker" was one of the earliest words to make its way from Latin to Saxon. It arrived before the softening of the Latin "c"s before "e" and "i." Our modern Neo-Latin renders it "cancer." It is interesting to note that the same word in its passage through the French became "chancre."

From the Celtic elements in the British Isles a few words were borrowed, at this period. "Hawk," to clear the throat, is Welsh; "gag" is Gaelic; "dandruff" is also Celtic. The Norse and Danish invasions left traces. "Ill," "egg," and "kidney" (koidh, belly and nyr, kidney) are Norse. "Slough" is Swedish. "Cough" is Frisian or Dutch (kuchen). The Anglo-Saxon form was "hwasten," akin to German "husten."

By the Norman conquest, the entire classic vocabulary was poured into English. For two centuries after the Conquest, English, at least in the literary sense, was a dead language. The official medium was French and our tongue was only the language of peasants and slaves. The Law Courts used French until 1362 and compiled their official reports in that language until 1600. French was used in the schools until 1387. Even today the royal assent to bills in Parliament is given in French. When English began to emerge from this eclipse it was saturated with French words, although the grammar and syntax remained almost unaffected. Practically all the words of culture and refinement had been forgotten by the boors who were its only speakers, and as the use of English was gradually adopted by the upper classes, the gaps were supplied from the familiar French. Even the word for "face" had to be thus replaced (Latin facies). One therefore need not be surprised to find but one word in thirty in our medical dictionaries to be of other than classical origin.

Many old words, however, maintain a lawless existence in the gutter. Thus, "arse" was once a perfectly respectable term. It is related not only to the German "arsch" also vulgar, but to the Greek "orros" a word which gave rise to the word for tail used in anatomical nomenclature. It appears in King Alfred, the Wycliffe version of the Bible, Swift and in all the older medical books, surely an honorable enough list for an expression now outlawed.

"Shit" is another vulgarism, once respectable. It was used in old medical treatises and was even translated into Latin as "scitta." Chaucer used it freely. One of the first books printed in English was Caxton's Aesop's Fables. Let me quote from this nursery favorite. "The wulf shate thryce for the grete fere that he had." Again "I dide shyte thre grete toordes." In an English Dialect Dictionary of Dorset, less than fifty years old, I find the following bit: "Shit—a term of contempt, *applied to men only*." The italics are mine. The word is cognate with the Greek "chedzein." It survives in good usage as the name of a bird, the shitepoke. Anyone who has ever shot at and frightened one of these ungainly creatures will understand at once. "Fart" appears in all the Teutonic languages and was once respectable enough for a monk to include the following in a collection of proverbs; "I should get a fart from a dead man as soon as a farthing from him."

In the period following the restoration of English as the language of science in England medicine was at a low ebb. It was largely in the hands of itinerant charlatans with but little education and a tendency arose to treat scientific terms in the same summary manner as ordinary speech. During this time when the written word was governed by the spoken, marked degeneration of our scientific vocabulary began to occur. For a time dialectic decay threatened to render the entire ancient classical nomenclature unintelligible. The clipping and curtailment of words as a rule corresponded with what was happening in France. For instance the "y" endings represent the French "ie." "Hemorrhagy," "anaesthesy," "hemophily," and "glycosury" are old examples of an almost universal tendency. Some had several forms as "hemiplegy" and "hemiplexy." The latter would be the more correct. "Hematome" unfortunately obscured the ending "oma," tumor. "Neuralgy" is now used only by the ignorant, but once it was in all the textbooks. "Tetanus" appeared in two old forms, "tetany," in imitation of the French, and "tetane" derived by the Saxon method. The French form as often happened survived with a special meaning and the Saxon type was restored to its classical shape.

This last example is a good illustration of what later became the rule. With the revival of learning ushered in by the Renaissance, a stabilization of the vocabulary occurred. It was also attempted to bring about as much of a restoration of the older forms as was compatible with the spirit of the language. In English classical words are represented either intact or by a simple deletion of the endings often accompanied by the addition of a silent "e" to the stem. It is not a matter of great moment that in many cases (i.e. hemorrhageia) the "i" or "ie" preceding these endings was looked upon as part of the ending itself and dropped. The important point is that a fairly regular and uniform method of handling these terms was developed and that it never obscured the stem of the word. This restoration has been very complete. Words formed like "herny" (hernia) are now rare in English. The vast majority have been rebuilt. "Palsy" is yielding to "paralysis"; "pleuritis" has recently been reintroduced. "Fancy" and "frenzy" have departed too far from their original meanings to make substitution possible. (Frenzy does not mean "phrenitis," "encephalitis.") "Ricketts," a British atrocity for "rhachitis" is also firmly intrenched for the same reason.

Chance or simply fashion has decreed the loss of many forms. An aged practitioner once told me that his patient's chest was full of "ronchuses," and I was quite surprised later to find that he had used a perfectly good, though obsolete, word to describe a coarse râle. The medieval "rotula," little wheel, is surely a better term for the kneecap than "patella," little pan. There is no reason for not speaking of the "humeral" artery (brachial) as our grandfathers did. It is astonishing to read any seventeenth century medical work and to note the number of strange words. "Strangury" has thus given way to "dysuria." Today "clyster" is rapidly disappearing as did its other forms, "clysma" and "clysis." Meanings often change so rapidly that it is difficult to keep up with them. Thus "typhoid" has acquired a very restricted meaning since the discovery of its causative organism, and is sharply differentiated from "typhus." However, to the laity in England "typhus" meant "typhoid." The experience of the British Army in the Salonika campaign taught everyone the difference and the terms are now differentiated by the laity as well as by the profession.

Our armamentarium of drugs is drawn from the whole world and their names are equally cosmopolitan. Chaulmoogra is Burmese; kaolin, Chinese; kousso, Abbysinian; cascara sagrada, "sacred bark" in Spanish. Moxa is Japanese and was the moss used to inflict therapeutic burns as counter irritants. The New World gave us a long series. Guiac, ipecac, and coca are Guarani; curari or more correctly woorara is Chilean Indian; chocolate, jalap and cubebs are Aztec; copaiba is Maya; jaborandi, Brazilian Indian; quinine, Inca. Analysis is sometimes interesting. Thus "ipecacuanha" came through the Portuguese, as shown by the "nha" ending. In Guarani, "pe" means flat, "kaa," herb, and "quana" vomit; a low herb which makes one vomit. As in the case of quinine the aborigines were fully aware of its medicinal properties.

With the rather sudden expansion in

scientific knowledge during the last century, there has occurred a corresponding increase in the vocabulary until at present it might almost be described as infinite. In literary circles, for some idiotic reason, it is not considered good form to use words not clearly recognized as standard English. Artificial limitations are thus applied to the language. New words cannot be coined freely. If they are coined they must at first be used between quotation marks and are looked at askance until they have gone through a rather painful process of naturalization. How different it is in German, for instance, they can freely combine any two or three roots and suffixes or prefixes of known import, and such new growths are encouraged instead of being frowned upon by the arbiters of good taste. Science fortunately follows the German example. Anyone can make up any sort of a word, and if it fills a need, there is no objection. The rapid growth of ideas has made this coinage a continuous performance so that in actual numbers of words, our vocabulary, is less than half of it, a century old. What would Sydenham, for instance, have thought of the following: diastase, creatinine, ichthyol, cystoscope, appendicitis, streptococcus, epinephrin. Newly found substances, methods or ideas require new names.

Fortunately this coinage has come almost entirely from classical sources. These new words follow so closely on older models that it is impossible to distinguish the old from the new by their forms. Only historical investigations can answer such questions. Any of the above words, judging by their appearance, might have been used by Celsus.

One of the conspicuous exceptions to this rule is our too free use of eponymics. The theory of rewarding great discoverers by this means has sentimental advantages, but practically offers great difficulties. For instance, nearly every fracture to which human bones are subject used to have some surgeon's name attached. This was such a useless burden to the student that most of them are now forgotten. Of the two outstanding exceptions, the ankle and the wrist; the latter is so mispronounced that one would think it was named to commemorate a dog instead of the great Scotch surgeon, Collés. Similarly the Trendelenberg position, named after Billroth's oldest and greatest pupil, should be accented on the first instead of the second syllable. Most similar words tend to loose their standing as proper nouns and are spelled without capital letters. Bilharz' and Lieschman's organisms have thus given rise to compounds not ordinarily capitalized. Schick is now even used as a verb in English. If it finds its way back into German, it will have exactly the same form as another very common verb. Roentgen would surely never recognize his name as the British pronounce it, "rahnshen." Such mispronunciation in the course of years tends to destroy the value of words as memorials. Another important point is that it is extremely difficult to decide in many cases to whom the credit for any discovery really belongs. Not only are discoveries often made simultaneously and independently, but it is wrong fundamentally to name a building after the man who erects the flag-pole. In most cases any new discovery is the work of hundreds of workers all over the world in the sense that they made the crowning step possible by accumulating related or basic facts. Many of our oldest names were thus given for entirely insufficient reason. Surely Scarpa did not discover the triangle that bears his name; the ductus Botalli was named after a Frenchman Botal, but as above noted, Galen was aware of its existence. Such absurdities might be multiplied indefinitely but there is already a consciousness that such nomenclature is not desirable. Biologists settle such matters by the appointment of a formal commission which judges priority. Doctors might well profit by the example, and also empower the commission to delete as many as appeared feasible.

Other words offer almost insuperable difficulties to tracing their origins. "Gas," for instance, is an entirely artificial word.

In about 1600 it was made up out of whole cloth by Van Helmont, the Dutch chemist. Previously there had been no such expression as even the existence of gases was problematical Van Helmont also coined another word, "blas" to express a concept like "ether." This did not fill any real need and is now forgotten. In the case of "syphilis" we are utterly at sea. The etymology "syn," "philos" is absurd. It would have given the form "symphilos" (as symphysis). For similar reasons the etymology "pig-loving" cannot stand. The derivation from the name of the shepherd in the medieval Italian poem is too fanciful. It is far more likely that the shepherd got the name from the disease. In such cases the only logical thing to do is not to be ashamed to say "I don't know." Wild guesses do not help the science of philology. In this connection it is amusing to note the attempts of each nation to fasten the stigma of syphilis on its enemies. "Morbus Gallicus" is still used but that was an Italian term. The French called it the Neapolitan disease; the Spaniards, the Turkish disease; the Turks the Christian disease; the Germans, the Polish disease; the Poles, the German disease and so on all over Europe. It is hardly fair for us to have fixed the stigma on the French.

Attempts to improve our medical English are beset with many pitfalls. Language grows: it changes from generation to generation by imperceptible stages and its evolution is not governed by reason. Chance, forgotten theories, ignorance, and false analogy play large parts. It must not be forgotten that meanings change as well as words. "Lues" is a very old word, but it has only meant syphilis in comparatively modern times. "Coxa" meant hip in Latin; "cuisse," thigh in French; "Hachse," skin in German; and "coss," foot in Gaelic. Again "mentum" is chin in Latin; "mant" is jaw in Welsh; and "Mund," mouth in German. Both illustrations represent different forms of the same stems. Therefore, we can lay it down as the first principle that *we cannot meddle with the meanings of words.* We must simply accept them in their present significance, no matter what absurd and illogical gyrations of meaning they have passed through.

As to *orthography*, the important point is to preserve as many as possible of the classical forms. Definite rules of transliteration in Latin are unnecessary and in Greek, a language with different letters, such rules already exist, having been framed by classical scholars for the transliteration of proper names. The important points are *uniformity* and *exactness of reproduction of the original* so as to favor the growth of an international terminology founded on a classical basis. In the case of terms which are already partially Anglicized, again our aim should be uniformity. Most of these are rather common words or they would not have undergone changes and no attempts to restore them are in order. Cutting off of the endings (including the "i" or "ie" often preceding them) should be the rule.

The *vocabulary* might well be simplified to a certain extent. Reduplication of words has been carried to extremes. Synonyms are all too common and they are useless. In anatomical files considerable has already been done in this connection and the work of the Congress at Basle might well be extended to the whole subject of medicine. Surely if one name is enough for each organ, it can also suffice for inflammation of that organ and for derived adjectives.

Finally, meddlesome attempts of cranks and purists must be disregarded. The objections made to such a term as "appendicitis" on the ground that it is a Latin word with a Greek ending, come from men who say "bactericidal" every day and would object violently to being asked to call their motor cars "suimobiles." Arbitrariness and unwarranted disturbance of a well-developed speech can only result in creating antagonism, although careful and systematic studies by a competent commission might bring about a considerable simplification of the task facing the freshman in medicine.

STUDIES IN PALEOPATHOLOGY, XXII

PYORRHEA IN A PLEISTOCENE WOLF

By ROY L. MOODIE, PH.D.

SANTA MONICA, CAL.

THE dire wolf (*Aenocyon dirus*) was by far the most abundant mammal in the Pleistocene fauna of southern California, and it roamed in great numbers on the slopes of the Santa Monica Mountains. Thousands of them, in their search for food, were trapped in the asphalt pits of the Rancho la Brea. Doubtless these dire wolves went in packs as wolves do today, and to this instinct is due the great numbers of skeletons in the tar pits.

When I began my studies, four years ago, at the Los Angeles Museum of History, Science and Art, where the great Pleistocene collection is stored, my attention was soon attracted to the skull and lower jaw figured herewith. These are very remarkable fossils, for many reasons. It is only by the rarest good fortune that skeletal parts are at all associated in the tar pits. When the animal's body was caught in the tar it was dismembered and scattered hither and yon by the other carnivores. The parts remaining together, after maceration, were separated by movements in the tar due to huge gas bubbles, which are still bursting in the pools as well as by the churning movements of the death struggles of large mammals. Thus it is that seldom are parts associated. In the present case the association was clear, one of the very few instances among thousands. Then another remarkable feature is the perfect condition of the dentition. Teeth are seldom preserved so beautifully, and usually some of them are lost. The upper dentition in this case (Fig. 1*a*) is perfect. The lower dentition is also perfect except for the incisors. The last and most remarkable feature of all, in connection with this wolf's head, is the clear and certain indication of *Pyorrhea alveolaris*. An examination of hundreds of skulls of this dire wolf reveals one similar example.

Since this skull and jaw have such wonderfully rare features it is thought worth while to place this sole case on record. It is so clear and convincing. It is with no thought of introducing here a paleontological discussion of the dentition of this rare skull. Such a discussion is needed, but it lies out of my interests at present. My original plan was to discuss the incidence of caries, pyorrhea and other dental disturbances and show by illustrations the exact condition of the dental armature of the Pleistocene mammals. While such a study will ultimately be made, yet it is indefinitely postponed by pressure of other work. I need only say that I have examined hundreds of skulls, and thousands of loose teeth and not one example of dental caries have I seen, however the possibilities are by no means exhausted.

In Chapter VI of my "Paleopathology," with the title "Caries and alveolar Osteitis among fossil Vertebrates," I have discussed the occurrence of such things as have been noted in the literature. Nothing has been added to our knowledge since that volume appeared.

An examination of the figures will show that the lesions due to Pyorrhea (Fig. 2) are of the same nature as we find today, i.e., osseous atrophy of the alveolar walls, the loosening of the teeth in their sockets, and the loss of the right lower incisors (Fig. 1*b*). The formation of calcareous granules within the alveoli is uncertain, because of the asphalt which has invaded all intertrabecular spaces. The cortex of the chin is unchanged (Fig. 2). The space between the huge canines is, however, roughened, due doubtless to two factors: muscle pull and inflammation of the area from the necrotic dental areas. The infection, if there is a definite causative infection in such cases, was confined to the alveoli of the incisor teeth. The four canines are not at all affected.

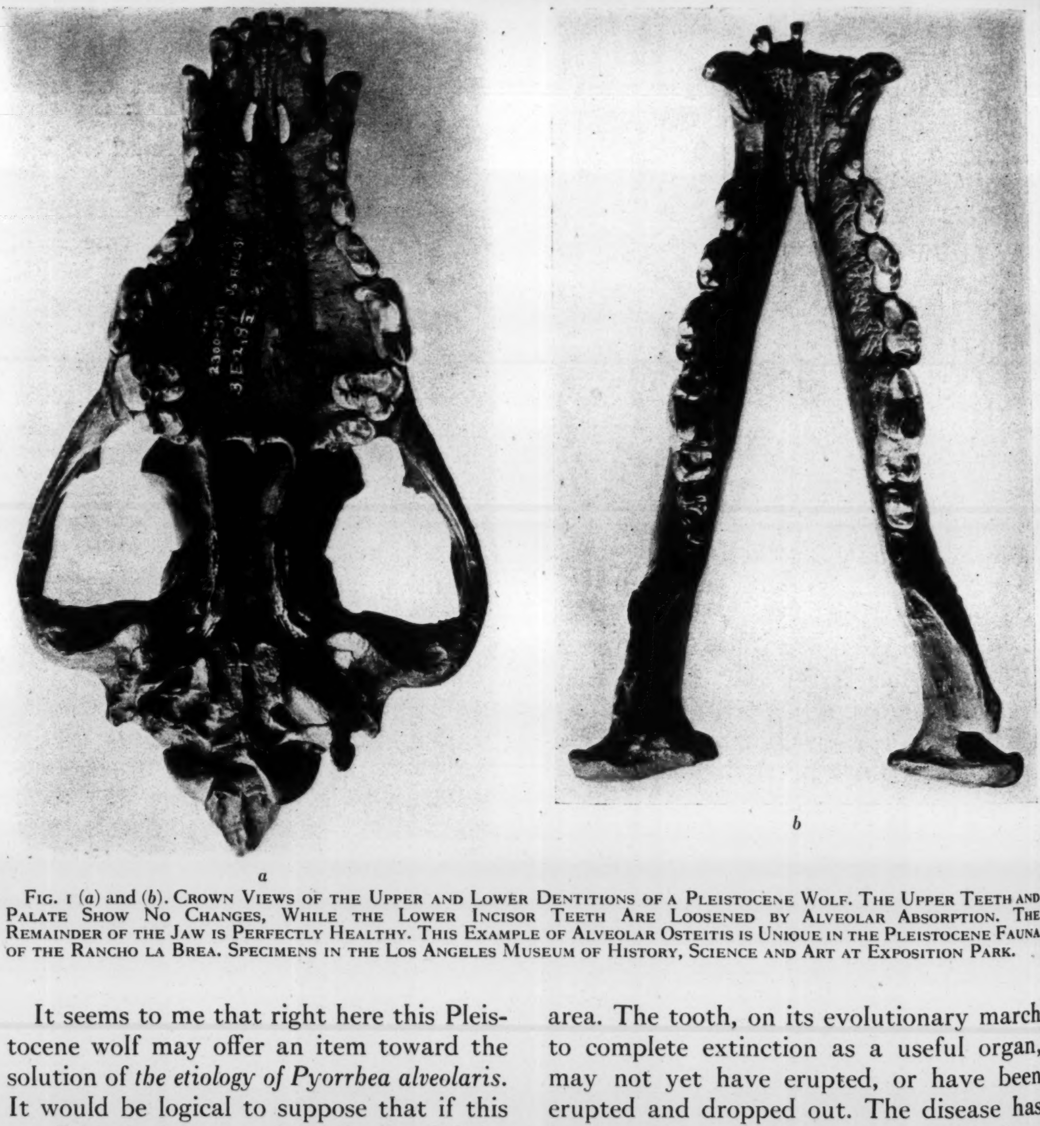


Fig. 1 (*a*) and (*b*). Crown Views of the Upper and Lower Dentitions of a Pleistocene Wolf. The Upper Teeth and Palate Show No Changes, While the Lower Incisor Teeth Are Loosened by Alveolar Absorption. The Remainder of the Jaw is Perfectly Healthy. This Example of Alveolar Osteitis is Unique in the Pleistocene Fauna of the Rancho la Brea. Specimens in the Los Angeles Museum of History, Science and Art at Exposition Park.

It seems to me that right here this Pleistocene wolf may offer an item toward the solution of *the etiology of Pyorrhea alveolaris.* It would be logical to suppose that if this condition is due to an infection by definite causative organisms, that the area involved would be more widespread. The adjacent canines are healthy, and since they were so near by why were their alveoli not also affected, and why did not the infection spread beyond the dog-teeth to the smaller premolars or to the upper dentition?

It will be seen that the most anterior premolar of the left side is missing, but this tooth is often missing in these wolves, and there is no indication of disease in that area. The tooth, on its evolutionary march to complete extinction as a useful organ, may not yet have erupted, or have been erupted and dropped out. The disease has been confined to the incisors. The last, right molar, a mere denticle, has likewise dropped out, but its alveolus is unchanged.

Save in the immediate area of the incisors gingivitis is not indicated, the cortex of the mandible being elsewhere normal, marked with blood vessels in the usual way. The upper dentition, too, is free of evidences of gingivitis. The teeth fit closely in their alveoli, and the palate sweeps up to them in a healthy cortex.

It would seem likely that the alveolus of the right median incisor was the place where changes set in earlier, or where changes went on more rapidly, resulting in the loss of the tooth. These right incisors may, however, have dropped out during excavation and cleaning. At any rate they had not been lost before the death of the animal, since regenerative osseous changes, to fill the empty alveolus had evidently not begun.

There is no evidence that trauma was a factor in this diseased condition. The matter is a local one of the incisor alveoli. The other parts of the head are healthy and there is nothing to indicate an unstable constitutional condition. The teeth are all worn at the crowns, indicating a vigorous middle age. The dorsum of the cranium presents a perfectly healthy cortex. The lower surface cortex of the jugal arches show abrasions which may be accidental, and they are almost certainly post mortem. If the remainder of the skeleton were at hand we might be able to show bodily changes elsewhere but the allocation of scattered osseous elements is very uncertain, and would render our observations of little value.

Thus alveolar changes in this fossil wolf offer food for thought. It is one of those rare examples, among extinct vertebrates, of an *idiopathic disturbance*. It is so rare as to be almost unique. I have estimated, after four years study, that fully 98 per cent, or more, of the pathological conditions found in the Pleistocene mammals, of the Rancho la Brea, are due and can be correctly traced, to violence, or to small traumae, many times repeated.

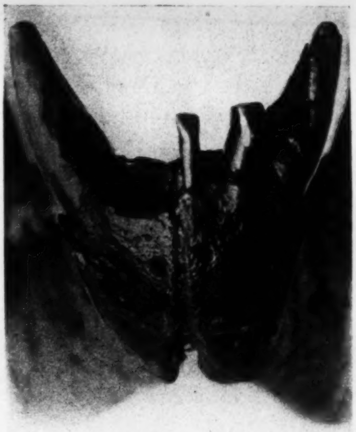


Fig. 2. The Chin of the Dire Wolf, Seen from in Front, Enlarged. The Vertical Median Line is the Suture. On Either Side Above Are Seen Two Large Vascular Foramina. The Cortex of the Chin is Clear of Any Evidences of Infection. The Two Right Alveoli are Empty, and Widely Necrosed. The Root of the Left Median Incisor Is Exposed by Absorption of the Anterior Alveolar Wall. The Other Remaining Incisor Likewise Has the Root Exposed. These Appearances Have All the Characteristics of the Alveolar Changes Following Pyorrhea Alveolaris, and to This Disease the Condition Seen in the Wolf Are Ascribed.

[Boyle: Opera Omnia. Venetiis, 1697.]

LUGOL, HIS WORK AND HIS SOLUTION

By J. ARTHUR BUCHANAN, M.D., M.S.

BROOKLYN, N. Y.

FREQUENTLY the name of a physician becomes associated with a disease, operation, treatment, or drug, while the life of the person thus distinguished is quite unknown. This is true of Lugol.

Jean Guillaume Auguste Lugol was born August tenth, 1788, at Montauban, Tarn-et-Garonne, France. Montauban was the outgrowth of a settlement, which started as a few huts in 820. Little further progress was made in its development in spite of its excellent commercial location until 1144, when Count Toulouse, under government guarantees, cleared off a large space of land, and began the development of the city. The city was the seat of a bitter protestant, catholic controversy in 1561. It was decimated, by pest, in 1629. In spite of these drawbacks it became an important educational center with the building of seminaries, a school of theology, a school of design and geometry, a school of agriculture, and public libraries. It also had a museum of art, archeology, natural history and commerce. In the midst of these educational advantages Lugol made his primary start in life. No information is available concerning his parents or his early interests.

Lugol carried out his medical studies in Paris. After serving an internship in a hospital in Paris, he received the degree of doctor of medicine in 1812. He was, probably, most interested in pathology, as after graduation he gave some lecture courses on internal pathology. The lectures were well received, and as a mark of commendation, he was appointed, April sixteenth, 1819, to the staff of the Hospital of St. Louis, where he spent most of his time thereafter. In the introduction to a course of lectures, he made the following apt remark:

> In the lectures which we formerly delivered upon internal pathology, we insisted with peculiar earnestness upon the subjects of diagnosis and treatment of the more common diseases. We were at that time, as now, firmly convinced that a due acquaintance with the science of medicine is not to be acquired by the investigation of maladies of rare and exceptional occurrence, so much as by the diligent study of those which present themselves daily in the practice of our profession, and in which, therefore, it is of the utmost importance that the student should receive early and solid instruction.

Medical educators today might take this advice, as every physician can well recall the hours spent listening to lectures, demonstrations, and clinics on diseases of rarity. This may be the result of Addison's teachings; he believed that the secrets of nature were often revealed by the study of the rare case.

PARAMOUNT INTEREST

The investigative and practical sides of the work of Lugol were consecrated to the study of scrofula. He considered the disease very much neglected, and endeavored to rectify the situation. In considering the work of Lugol one must keep constantly in mind that in his time scrofula had not been separated into distinct clinical entities. His ideas are very confusing, as he was dealing with similar clinical conditions with at least two different causative factors, the nature of which were unknown to him. He was very dogmatic in his opinions, and positive that all of the rest of mankind was wrong. The lessons of life are learned from reading the works of the dogmatic, and it is well to bear his life in mind today when dealing with many little understood diseases, over which many wax dogmatic and positive, and lay themselves open to the laughter of those who are to follow.

PATHOLOGY OF SCROFULA

The pathology of the scrofulous diseases, at that time, was considered a low grade inflammation of the lymphatic system generally, and especially of the mucous membranes. The eyes, ears, nostrils, vagina, and intestines were thought to be most frequently involved by the processes. The skin manifestations were considered to be in the form of chilblains on the hands, face, and feet; eczematous eruptions on lips, eyelids, and ears; acne on the forehead; pustules, grouped in various forms upon one or more regions, with ulcers more or less numerous, and of varied extent. The essential lesion of scrofula was believed to be the tubercle, which Lugol believed developed spontaneously. It was, moreover, to be remembered, he said, that very seldom did scrofulous diseases exist singly; they were commonly observed to occur under two or three forms at the same time.

Of the associated diseases, he laid most stress on pertussis, and considered it almost a universal disease of the patient's earlier life history. He thought that there was an intimate connection between the two diseases. He felt, also, that erysipelas was a primary sign of the invasion of scrofula. He noticed that scrofula and pulmonary tuberculosis were frequently associated. Syphilis was observed to bring out the scrofulous taint, and to light up with great rapidity a quiescent lesion, as well as to cause relapse in any lesions which were then progressing toward healing.

Scrofula was found in males and females; white and black; but in the latter it was more fatal; in fact, Lugol was never able to cure a case of scrofula in the negro.

ETIOLOGY

The anatomic pathologists of the time did not try to discover the cause of the condition, but they were suspicious that all the manifestations were not due to one cause. Lugol resisted this vacillation about possible different causes, and maintained energetically the united pathology of the different manifestations of which the ensemble constituted scrofula.

To his own satisfaction, at least, he elucidated the principal points of the etiology of the morbid entity by searching into the state of health, and into the age, more or less advanced, of the parents; in consanguinity, and especially in direct heredity.

JEAN GUILLAUME AUGUSTE LUGOL.

MARRIAGE AND SCROFULA

Parents under twenty-five were advised by Lugol that they should not have children as the products of the union were frequently unhealthy. He also taught that children from fathers of forty-five years or over were usually feeble. A disproportion between the ages of parents was supposed to cause scrofula in the children. He maintained that whenever the man was less physically robust than the woman the children were likely to be scrofulous. He admitted that there might be a combination of causes in parents leading to scrofula in offspring.

Lugol considered marriage to be the most common cause of the spread of scrofula. Scrofulous mothers were advised not to nurse their children. He observed that pregnancy and childbirth increased the severity of an existing changing scrofulous lesion, and often made active an apparently healed case, especially in the physical strain of parturition.

He stated that scrofula caused a fourth of the spontaneous abortions, as a result, most often, of a degradation of the generative faculty in the man, rather than of the same function in the female. His studies showed that fully half of the scrofulous infants died in the first few years of life.

He felt that the offspring from scrofulous parents were of a particular type. They developed slight musculature, with many bony deformities, and were short in stature as a rule. Children of such parentage suffered usually from chronic fatigue, and were particularly tired in the mornings. He claimed that scrofula arrested the moral and physical development of children, and thereby was a great disturbing factor in the evolution of childhood and youth.

HEREDITY

Scrofula was considered hereditary because of the general occurrence of the disease in the family afflicted, and by the mortality which it occasioned. In the families a certain constitution was necessary. He thought that a man who was born of scrofulous parents and was the father of scrofulous children was scrofulous, even if his health was good. Scrofula never passed over a generation. He believed that children were scrofulous whenever one of the parents was of the scrofulous constitution, and they were only free from scrofula when neither father nor mother exhibited a hereditary taint. If parents had scrofula as children, although later healthy, they were likely to have scrofulous children. If parents were healthy, but siblings were scrofulous, they in turn were likely to have scrofulous children.

He considered direct heredity the most common cause of the malady, which was the object of his researches. In discussing the possible causes, he said:

> If there be none apparent we admit the agency of an hereditary cause as a matter of course, for one of two things must be allowed, either that the disease is hereditary, or that there has been an effect without a cause.

His conceptions of the workings of heredity are interesting. He noticed scrofula spread among a family, in 1828, in the Hospital of St. Louis, but he believed that the causative germ resided in the constitution of the patient, and that the disease was truly hereditary. He said, "The patients or their friends constantly substitute the false for the real, the fancied occasional causes for the only true one, hereditary transmission."

Although Lugol wrote a good deal about the causative factors, he really did not think it was important to determine the cause. Scrofula was scrofula, and why worry about the cause, summed up his attitude. This was shown in the discussion of the illness of a man who had a phagedenic ulceration of the alae nasi, the nature of which whether scrofulous or syphilitic was uncertain. He was inclined to the former opinion, but in point of fact, he considered it immaterial which view of the cause was taken, for the consequences were the same. He evidently believed that the father in this instance carried in his constitution the germ of a disease which rendered his progeny scrofulous. The ancestors in this family had had scrofula, and he maintained that if a single individual in a family had scrofula, ipso facto, all the others had it.

TRANSMISSION BY CONTAGION

Although he knew that syphilis could be transmitted from patient to patient, and that pulmonary tuberculosis was common in the scrofulous, he did not believe scrofula contagious, even while considering syphilis one of the causes of the disease. He stated:

> As far as our opinion is concerned we can affirm without hesitation, that, after five and twenty years acquaintance with scrofula in all its forms and degrees, we have never observed a single case of contagion. We have never known a husband to communicate scrofula

to the wife, nor the wife to the husband. The intimate relations of conjugal life do not inoculate the malady, even when one or the other of the partners is deeply diseased.

His ideas about contagion were certainly dogmatic and based on a failure to analyse events which occurred many times under his own observation.

TYPES OF IODINE PREPARATIONS USED

The use of iodine by Lugol was extensive for local application, as well as for oral administration. He used three solutions for oral administration. Number one comprised: iodini (grains ¾), potassi iodidi (grains 1½), aquae (oz. 8); number two comprised: iodini (grains 1), potassi iodidi (grains 2), aquae (oz. 8); and number three comprised: iodini (grains 1¼), potassi iodidi (grains 3), aquae, (oz. 8). The treatment of all cases was instituted by the administration of two thirds of number one in the day, equal to half a grain of iodine. This was kept up for two weeks, and in the second fortnight, the entire solution was given in a single day. The dose was gradually increased by giving the second and third formulas, but the third was never exceeded. He considered the maximum dose to be 1¼ grains of iodine in twenty-four hours. He laid great stress on the time the medicine was given; the first dose, consisting of half the daily quantity to be taken, was given before breakfast; the second dose was given in the afternoon, an hour before dinner. The medication was given intermittently, as it appeared to lose its action. The periods of intermission covered two or three days during the season of treatment, and during this interval a purgative was given.

Lugol used a great variety of solutions for external application, which were applied in many different ways.

1. He recommended a general iodine bath, which was given in a wooden or marble tub, so as to prevent chemical combinations with metal tubs. The bath consisted of 60 gallons of water, iodini (3 drachms), potassi iodidi (6 drachms).

2. In order to stimulate growth of epithelium or for counterirritation, he used a solution consisting of iodini (4 drachms), potassi iodidi (oz. 1), aqua distill. (oz. 8). This was applied over scrofulous ulcers after dilution with sufficient water to give a yellow solution.

3. In the treatment of glandular swellings, and other inflammatory lesions of a scrofulous nature, he used a plaster made of linen, on which the solution described in paragraph number two was applied.

4. When the solution described in paragraph two failed to excite growth in an ulcer, or in cases where there was excessive granulation, a caustic solution was used, which consisted of iodini (drachms 1), potassi iodidi (oz. 1), aquae distillat. (oz. 2).

5. He also gave what he called an iodated bath, which was taken in a wooden vessel. This type of bath was for general stimulation, and of the four solutions recommended sufficient was added to the water to give it varying depths of yellow, depending upon the degree of stimulation desired. The solutions had the following composition.

	1	2	3	4
Iodini	ʒii	ʒiiss	ʒiii	ʒiv
Potassi hydriod.	ʒiv	ʒv	ʒvi	ʒviii
Aquae distillat., q. s.	℥vi	℥vi	℥vi	℥vi

6. Lugol used iodine for injections and lotions in what he called ioduretted solutions, of which there were three strengths.

	1	2	3
Iodini	grains ii	grains iii	grains iv
Potassi iodidi	grains iv	grains vi	grains viii
Aquae distillat.	℥i	℥i	℥i

This solution was used as a collyrium; for fomentations in all sorts of scrofulous affections, and for injection into fistulous passages, chronic abscesses, diseased joints, and for vaginal douching in the treatment of leucorrhea, as well as nasal douching in the treatment of ozena.

7. Lugol used various types of ointments of iodine, from which some of our present day remedies probably had their origin.

	1	2	3	4
Iodini	grs. xii	grs. xviii	℈i	grs. xxi
Potassi iodidi	℈iv	℈ii	℈iiss	℈iiss
Adip. recent.	℥ii	℥ii	℥ii	℥ii

The varying strengths of these pomades or ointments were used in dressings on scrofulous ulcers, and as lubricants in friction massages to similar swellings.

DEVELOPMENT OF PRESENT SOLUTION

Lugol used a solution, which he called Liquor Potassii Iodidum Comp. The solution consisted of potassii iodidi (gr. x), iodini (grains 5), aquae distillat. (01). It is from this solution that the one now known as Lugol's has developed.

A search through the United States Pharmacopeia gives some interesting information. In 1840, iodine for the first time was included, and besides the element, one solution was mentioned, namely Liquor iodidi compositus; called compound solution of iodine, which was to be made according to the following formula. Iodini (6 drachms), potassii iodidi (oz. 1¼), aquae distillat. (01). The instructions stated that the iodine and iodide of potassium were to be dissolved in the water.

In 1870, the United States Pharmacopeia contained the first mention of Lugol's name, after a solution called Liq. Iodini Compositus, which consisted of iodini (5 parts), iodidi of potassi (10 parts), distilled water (85 parts), to make 100 parts. The same information is contained in the issues for 1880 and 1890.

In 1910, the Pharmacopeia contains the expression, "Liq. Iodi compositus, Lugol's solution." It was described as an aqueous solution containing not less than 4.8 per cent, nor more than 5.2 per cent of iodini, and not less than 9.8 per cent, nor more than 10.2 per cent of potassium iodide. The formula as given in the text is, "Iodini, 5 grams; potassi iodidi, 10 grams; aquae distillat., q. s., ad. 100 grams." This formula fixes the contents of the formula as used today. The proportions of both iodine and potassium iodide are increased over the amounts in the original formula, so that what today is called Lugol's solution really is not Lugol's solution.

LUGOL'S METHOD OF TREATING SCROFULA

The methods used may be classified as (1) drugs, essentially iodine and cod liver oil; (2) fresh air; (3) exercise; (4) cold bathing; and (5) good hygiene.

Lugol was the first to introduce into therapy the use of iodine in connection with scrofula. His first work on this subject appeared between 1829 and 1831.

The solutions described previously were given internally, and applied externally depending upon the type of lesion present. He believed in the use of very small doses, and was in controversy with the men of his day, because the dose usually employed was much larger. He gave iodine internally from April to October of each year in order to take advantage of the seasonal influences.

Cod liver oil was popular with Lugol as it is with many physicians today. He thought that its action consisted in stimulation of the lymphatic system, thereby increasing the activity of the capillary system. By its action on the former, the processes of assimilation were facilitated, and the appetite increased. The quality of the blood was thus improved, and so, lastly, the different organs of the body became better nourished, and received more turgor vitalis.

The local lesions of scrofula were treated by ointments, injections, and baths.

FRESH AIR AND EXERCISE

Out-of-door life in the fresh air was recommended to scrofulous patients. Light was considered essential in the treatment of the disease, but no system of sunlight treatment was used. The quantity of moisture in the air was considered unimportant, as Lugol believed that the much praised anti-tubercular climate, namely, high altitude, was of no value, as he found as many tubercular at high altitudes as at low. It seems when reading such passages that he knew that scrofula was really one of the manifestations of tuberculosis.

Exercise was recommended to scrofulous patients, but in this he was at variance with the physicians of his day, as well as those of today. He advised exercise for joint trouble, and by way of enforcing his ideas on this mode of treatment, he said:

> But the treatment of white swellings by absolute repose is recommended even to the present day. The consequence of such treatment is seen in the atrophy and permanent flexure of the affected limbs; and those who are cured remain so disfigured and with members so useless that they are after all, in many cases, obliged to submit to amputation.

BATHING AND FOOD

Cold bathing was considered of advantage to the patient with scrofula, especially sea bathing, which he thought a valuable adjunct in the treatment of scrofula.

Lugol's patients with scrofula were given a full diet, and advised to eat meat in large quantities, as he thought that food had especial merits. He also recommended the moderate use of port or wine. There are perhaps vestiges of his ideas hanging about today.

PROPHYLAXIS AGAINST SCROFULA

Lugol's advice in order to prevent the malady, which interested him so much, is noteworthy. People were advised not to marry before the twenty-fifth year, nor after the fortieth year, as before and after those ages the offspring were particularly likely to be scrofulous. Above all things intermarriage was forbidden. Patients were advised not to marry a person with scrofula, as the offspring were sure to have the disease. He thought that scrofula could be prevented by the care of children with the so-called strumous habit. He thought that they should be protected against variations in temperature, as they were very susceptible to colds. He thought that it was injurious to try to harden delicate children by exposure to cold, but believed that the child was benefited by cold baths, as its general vigor was thereby enhanced, and its tendency to catarrhal attacks was reduced.

FAMILY HISTORY

In spite of many efforts on my part directed through the Legion of Honor and through the Academy of Medicine in Paris, I have been unable to secure any data of worth concerning Lugol, the man, and his family. He was married in 1833, and this union resulted in a son and a daughter. His daughter married Paul Broca, and their two sons, Andre and Auguste, are well-known in the scientific world. The daughter of this union is still living, but she has no knowledge concerning her grandfather.

OUTSTANDING EVENTS IN HIS LIFE

Lugol was elected a member of the Medical Society of Paris on the second of March, 1819, and appointed "medicin suppleant," to L'Hôpital de St. Louis, on April sixteenth, 1819. He was elected a chevalier de la Legion D'Honneur on the tenth of February, 1832. An organic affection of the heart, probably angina pectoris, caused his death in Geneva on the sixteenth of September, 1851.

SOURCES OF INFORMATION

A complete list of the publications by Lugol is to be found in the Index Catalogue of the Library of the Surgeon General's Office (s. 2, IX, 775). A similar reference to his works is found in the Dictionnaire Encyclopédie des Sciences Medicales (P. Asselin and G. Masson, Paris, s. 2, III, 175).

Brief reference to the life of Lugol is made in the Biographisches Lexikon dei Hervorragenden Aerzte, Aller Zeiten und Völker (5 sect., Wien, Leipz., Urban und Schwarzenberg, 1886, 64). A similar degree of consideration is included in La Grande Encyclopédie (H. Lamiroult et Cie., Paris, XXII, 749).

Lugol's book on Researches on Scrofulous Diseases, after its second edition, was translated into English in the United States by Dr. Sidney Doane, and published by J. S. Redfield, Clinton Hall, in 1847. A later edition was translated in England by W. Harcourt Ranking, M.D., and published by John Churchill, Princes Street, Soho, in 1844. The *Lancet* of June third, 1844, contains an editorial, which expresses the feeling concerning Lugol's work at that time.

It is the first part of this "ten times revised" work which M. Lugol has just published, and after a careful perusal of its contents, we are able to say without hesitation, that it is one of the most valuable monographs that have been presented to the medical public for many a year, and is calculated to deeply modify the views of the profession with regard to the pathology of scrofula.

Time is quite essential in establishing the real significance of most problems concerned with a disease, as well as with its cause, and its treatment.

EDITORIALS

MARCELLO MALPIGHI

Although the two hundredth anniversary of John Hunter's birth has been celebrated by addresses, meetings and exhibitions, the tercentenary of the birth of Marcello Malpighi has not, at least in England or the United States, attracted much attention, in spite of the universally recognized importance of his many scientific contributions.

Marcello Malpighi was born at Crevalcuore, near Bologna, on March tenth, 1628, the year in which Harvey published, at Frankfort-am-Main, his "De Motu Cordis et Sanguinis," a curious coincidence when we recall that in 1660 his discovery of the capillary circulation was to supply the missing link in Harvey's chain of demonstration of the circulation. He studied medicine at the University of Bologna, at that time one of the foremost medical schools in the world. During a part of his student life he lived in the house of Bartolommeo Mascari, whose sister Malpighi subsequently married. Mascari not only taught in the University but organized a sort of anatomical society which met in his house to dissect, experiment and discuss the new anatomical discoveries.

Malpighi must have been a youth of great promise. He received his doctor's degree in 1653, and only three years later was given a teacher's chair in his Alma Mater. Shortly afterwards he accepted the chair of professor of theoretical medicine in the University of Pisa, where he entered into a close friendship with Borelli, then busily occupied with the study of the mechanics and physics of the vital processes which later entitled him to the name of founder of the iatromathematical school of medicine. Malpighi, Borelli and Francesco Redi were the three most active members of the Academia del Cimento at Pisa, one of the earliest of the many learned societies to which the new ardor for science gave birth in various countries in the sixteenth century. For three years Malpighi stayed at Pisa but his health suffered so much from the climate that at the end of that time he resigned and returned to Bologna where he resumed his chair as professor of medicine. In 1662 he resigned and went to the University of Messina, where he served as professor of medicine for four years. When his term expired he refused re-election and returning to Bologna occupied his old chair in that University for twenty-five years.

The microscope had been discovered in the early years of the sixteenth century and Malpighi was to become one of the greatest of those who realized and utilized its immense value in scientific research. With his great contemporary Anthony van Leeuwenhoek, the Dutchman, and the Englishman, Nehemiah Grew, Malpighi opened new fields to his fellow-workers. When we think that what they accomplished was done with a simple microscope it is truly marvelous. We can glance at but a few of Malpighi's achievements. It is curious that most of them were first recorded in the Proceedings of the Royal Society of London. In 1667 Oldenburg, the Secretary of the Royal Society, having heard of some of Malpighi's work, wrote to him asking that he communicate the results of his investigations from time to time to the Society. With this request Malpighi gladly complied and as a consequence most of his important scientific contributions were published by the Royal Society of London.

The active Oldenburg had also enlisted Leeuwenhoek in the same manner and thus the Royal Society had the honor of publishing the work of the two greatest natural scientists of their day. In 1686 the Society published Malpighi's complete works in two fine volumes, with many illustrations.

Malpighi was the first great student of the histology of plants. He presented his "Anatomia Plantarum" to the Royal Society, December seventh, 1671, and on the same day Nehemiah Grew presented to the Society his book, "The Anatomy of Vegetables Begun." Malpighi's treatise was in manuscript, Grew's had been printed at the order of the Society, so that the Englishman could really claim priority. Though Grew's book was a valuable treatise and showed great original work, Malpighi's treatise far surpasses it as a scientific accomplishment.

Malpighi's studies of the microscopic anatomy of many animals, especially his exhaustive study of the anatomy of the silkworm, entitle him to high rank as a comparative anatomist, and his embryological studies far exceed in value those of any of his predecessors, but it is as the founder of the science of histology that he especially deserves to be remembered. He was the first, in 1661, to observe and describe the vesicular nature of the tissues of the lung, the termination of the trachea in the bronchial trees and the anastomosis of the pulmonary arteries and veins. In 1665 he describes certain objects which he saw in the blood in the omentum of a hedgehog. He considered them to be fat globules but from his description of their appearance they were undoubtedly blood corpuscles. This was the first printed reference to the corpuscles. Swammerdam, the great Dutch microscopist had observed them in 1658, but his book "Biblia Natura" was not published until 1738, when it was brought out by Boerhaave, the author having died in 1680. Leeuwenhoek, in 1674, published the first accurate description of the blood corpuscles in a communication to the Royal Society.

In 1665, Malpighi discovered the *rete mucosum*, which is usually given his name to this day, and in the following year he first correctly described the structure of the liver, and gave the name to the *acini* of that organ. He also described the histological structure of the kidney and his name is preserved in the pyramids and capsules of that organ, and he won yet another godfathership in anatomical nomenclature, by his description of the Malpighian corpuscles in the spleen.

Malpighi carried on many other investigations besides the important ones which we have mentioned. He was also a very busy clinician and pathologist. He seems to have had a most lovable disposition and to have endeared himself to his colleagues and pupils as well as to his large clientele of patients. In 1691, Pope Innocent XII insisted that he come to Rome to serve him as his physician. Malpighi tried to refuse the invitation but finally yielded. Three years later he died of cerebral hemorrhage. His body was taken back to Bologna and buried in the church of San Gregorio. F. R. P.

TWO PICTURES OF EMIL NOEGGERATH (1827–1895)

The insertion of photographs of Noeggerath has been prompted by the timely contribution of Dr. Herbert S. Reichle in the ANNALS OF MEDICAL HISTORY.[1] The centenary of Noeggerath's birth was recently featured in two valuable memorial notices by Prof. Paul Diepgen[2] and Prof. Ferdinand Zinsser.[3] When Noeggerath died in 1895, the only obituary tribute paid was seven lines in *Virchow's Archiv.*[4] Yet he was one of the most remarkable gynecologists of his period; with Jacobi he was a founder and co-editor of *The American Journal of Obstetrics* (1868–71), author (with Jacobi) of a large volume of "Contributions to Midwifery and Diseases of Women and Children" (1859), inventor of the operation of epicystotomy (1853), of a pessary (1858) and a method of examining the uterus and adnexa (1875), finally creator of the doctrine of latent gonorrhea and its consequences in women (1872), which antedated Neisser's discovery of the gonococcus (1879) and had to wait upon the subsequent work of Bumm (1885), Max Sanger (1889) and Wertheim (1895–96) for adequate recognition. When Carl Hennig reported on Noeggerath's theory in the Medical Society of Leipzig in 1874, it encountered almost unanimous opposition, even on the part of Credé. This opposition, however, does not explain the curious pall of silence which enshrouded Noeggerath's memory after his death. In 1885, he left New York to settle in Wiesbaden, where during the ten remaining years of his life, he produced two papers which have been signalized as memorable, viz., a method of staining growing bacteria on colored culture-media (1887) and a study of the pathogenesis of carcinoma (1892). During my student days, I heard much of Noeggerath's work from the chair of gynecology and intrigued by the singular obituary reticence following 1895, I applied to some eminent authorities for personal (historical) information about this remarkable character. Replies, if any, were absolutely noncommital, but Dr. Jacobi mailed to me the *carte-de-visite* photo (with bared head) reproduced above, which is identical with the picture accompanying Professor Zinsser's article. The picture with the furled hat, evidently of a later period, was reproduced in the Album of the Fellows of the American Gynecological Society (Philadelphia, 1901). Both suggest a man of unusually thoughtful nature, handicapped by a fragile habit of body, allied to the phthisical. A sentence in Dr. Reichle's article is suggestive: "this extremely critical mind also seems to have brought him much animosity." The following anecdote, related by the late Dr. Joseph Taber Johnson, Professor of Gynecology, in the University of Georgetown, will illustrate this phase. On one occasion, Dr. Noeggerath sent to an eminent pathologist for examination a syrupy yellow fluid, apparently from some gynecological preparation. The microscopic expert duly reported upon this fluid, in a particular medical society as unquestionably from an ovarian cyst, whereupon Noeggerath, who had slipped in meanwhile rose and stated that it was actually from a hydrocele in the male testicle. Homeric laughter ensued and the twain never spake again.

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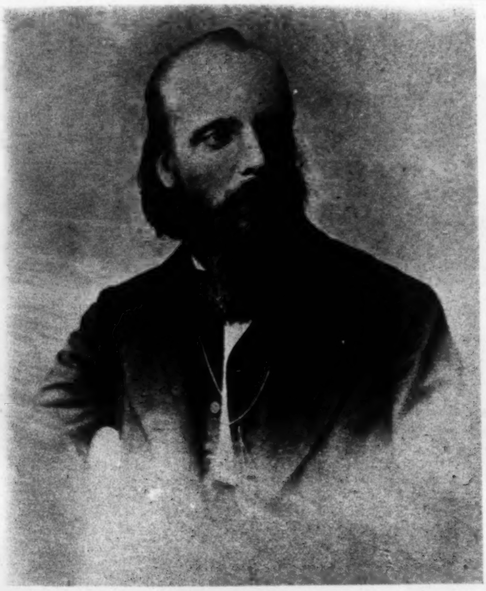
[1] Reichle, H. S. Emil Noeggerath (1827–1895). ANNALS OF MEDICAL HISTORY, 1928, x, 77.

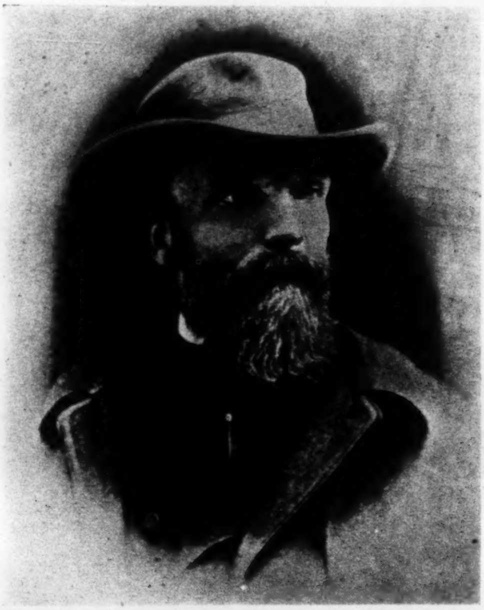
[2] Diepgen, P. Emil Noeggerath. *Klin Wchnschr.*, Berl., 1927, vi, 196.

[3] Zinsser, F. Emil Noeggerath. *Munchen. med. Wchnschr.*, 1927, lxxiv, 1677.

[4] *Virchow's Archiv. f. Path. Anat.*, 1896, cxliii, 680.

F. H. GARRISON.


EMIL NOEGGERATH (1827–1895).


EMIL NOEGGERATH FROM THE ALBUM OF THE AMERICAN GYNECOLOGICAL SOCIETY, 1901.

BOOK REVIEWS

Crawford W. Long and the Discovery of Ether Anesthesia. By Frances Long Taylor. With a foreword by Francis R. Packard, m.d. New York, Paul B. Hoeber, Inc., 1928.

There has been so much written about the "Ether Controversy" and its participants that it would seem superfluous to expect anything new bearing upon the subject. The present volume differs materially from all the preceding literature. It is a matter of fact account of the life story of the man who, as is now universally conceded, first used ether to produce anesthesia during a surgical procedure. The author of this work, who is the daughter of Crawford W. Long, after devoting many years of her life to the vindication of her father's claims, has written a charming account of his life and activities, in the course of which we get intimate glimpses of the life of a small town doctor in the South before, during and after the Civil War. Long graduated from Franklin College, Georgia, in 1835, and then went to the University of Pennsylvania, from which he received his medical degree in 1838. Thus he had a good foundation when he settled down to practice in the little town of Jefferson, Georgia, and it was there that, on March thirtieth, 1834, Long administered ether to James M. Venable, and while he was under its influence, removed a small cyst from the back of his neck. There is undoubted proof that Long administered ether to a number of persons before W. T. G. Morton, on October sixteenth, 1846, first gave a public demonstration of its value in the operating theatre of the Massachusetts General Hospital. The controversy which arose is necessarily dealt with at length by Mrs. Taylor.

This little book is a beautiful expression of filial loyalty and a valuable contribution to the literature of a once bitter strife.

Edward J. Klopp, m.d.

International Clinics. Edited by Henry W. Cattell, m.d. Vol. ii. Thirty-seventh Series, 1927. Phila., J. B. Lippincott, 1927.

This volume contains a very interesting article on "Medicine from the Standpoint of History," by Dr. John R. Oliver, of Baltimore. It begins with a reference and some extracts from a little known book by Erasmus, entitled "Declamation in Laudem Artis Medicae," the dedicatory letter of which is dated March 13, 1518. This letter is addressed to Henry Afimius, a physician of Lierre, near Antwerp. The little book has been translated into German, and it is said into English, but Dr. Oliver has been unable to find any trace of an English edition. Oliver uses Erasmus' Declamation as a test for an excellent homily on the value of the study of medieval history, and especially emphasizing the fact that from the past and present we may to a great extent deduce what the future will be. Dr. Oliver thinks that the deductions thus drawn present a not altogether cheerful aspect. He gives an abstract of Sigerist's views on the periodicity of medical history and an outline of his classification of the periods into which it falls. We are in his fifth period, in which the new ideas and thoughts of the preceding period are developed and applied, "There are no great writers but there are many commentaries written on the ancient ones." At the commencement of the nineteenth century our European medicine is fundamentally complete in form and application. According to Sigerist henceforth we find no definitely new ideas; "Our discoveries are all merely application or developments of what has been achieved in preceding periods." It seems to us that too short a time has elapsed since Pasteur, Lister, Virchow and Koch, for us to feel that we have reached our limits. Radium, the roentgen ray, and insulin are within the limits of the twentieth century and they are hardly to be classed as merely applications of old ideas. Francis R. Packard.

ANNALS OF MEDICAL HISTORY

Editor: FRANCIS R. PACKARD, M.D., Philadelphia

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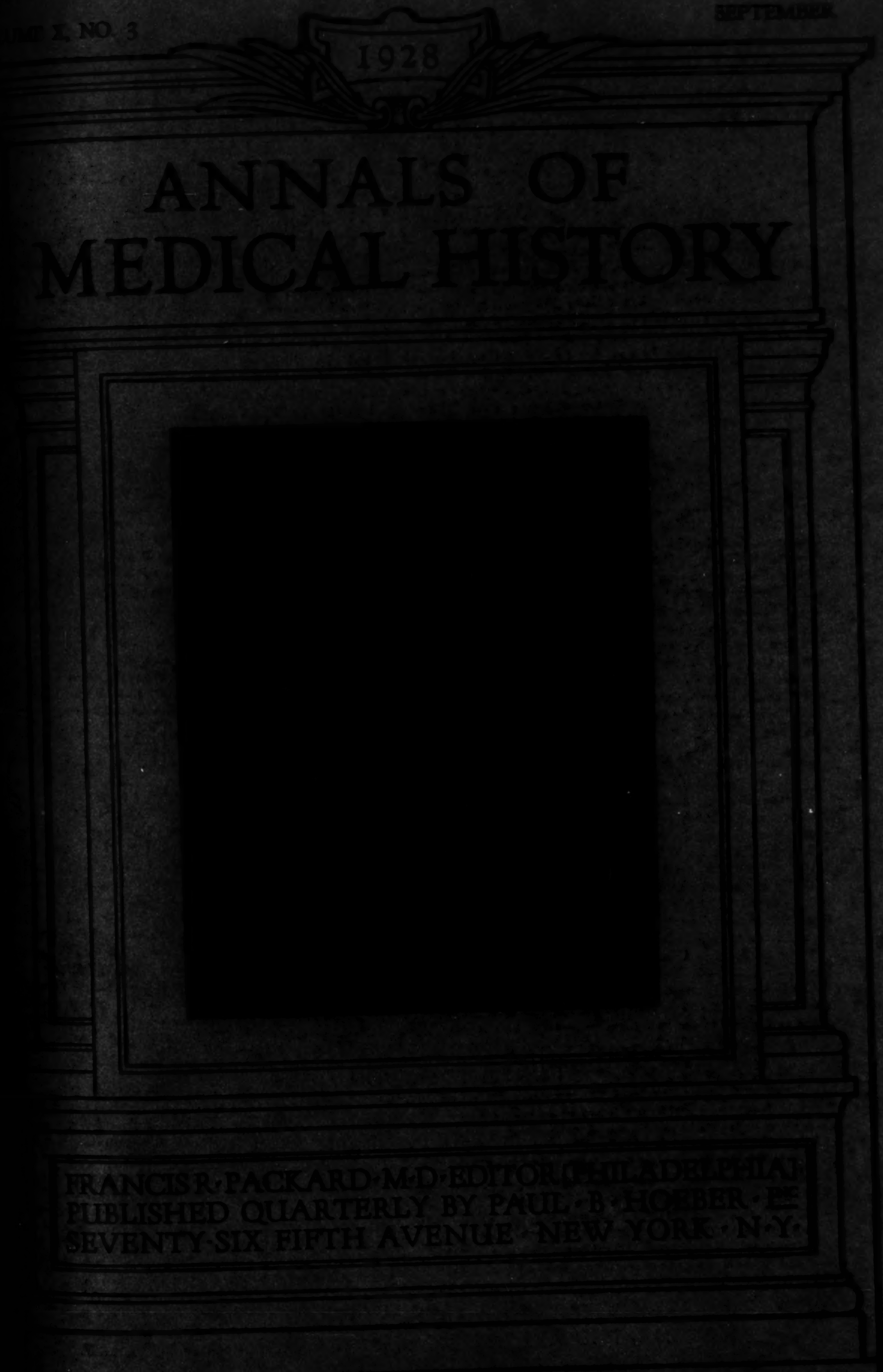

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